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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

| (51) International Patent Classification 5 : | | (11) International Publication Number: | WO 94/10637 |
|---|---|---|---|
| G06F 15/21, 15/40 | A1 | (43) International Publication Date: | 11 May 1994 (11.05.94) |

(21) International Application Number: PCT/US93/10557

(22) International Filing Date: 1 November 1993 (01.11.93)

(30) Priority data:
9222884.0 30 October 1992 (30.10.92) GB

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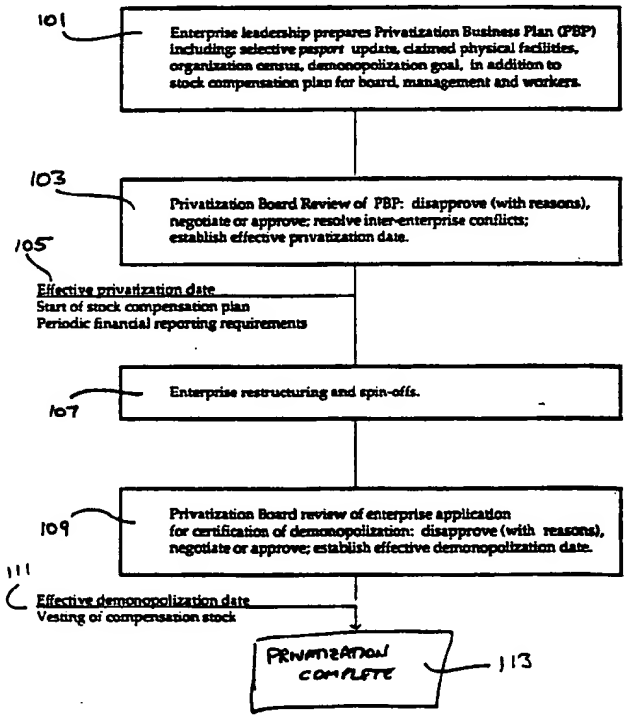
(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

**Published**
*With international search report.*
*Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.*

(54) Title: METHODS AND TOOLS FOR COMPUTERIZED SUPPORT OF A MARKET ECONOMY

(57) Abstract

Computerized methods and tools for developing and implementing economic policies are provided. The methods and tools may include the use of an adaptive knowledge base for assisting in the formulation of policies and the use of a computerized financial market trading system for the implementation of those policies. The tools are suitable for implementation using a wide range of computer hardware, including personal computers (PCs) and mainframe computers. The methods and tools do not rely on advanced communication or financial market trading infrastructure. These tools will operate in a broad range of applications in both developing and developed economies. The method further includes the principal steps of preparing a privatization business plan (101), reviewing said plan by a Privatization Board (103), executing the plan (105), restructuring the enterprise in accordance to the plan (107), submitting an application for certification of demonopolization to the Privatization Board (109), and receiving an effective demonopolization date drom the Privatization Board (111).

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# PATENT APPLICATION

for

# METHODS AND TOOLS FOR COMPUTERIZED SUPPORT OF A MARKET ECONOMY

## FIELD OF THE INVENTION

The present invention is generally related to the fields of information technology and market economics. The invention is more particularly related to computerized tools and methods useful for achieving a successful market economy. Yet more particularly, the present invention is related to tools and methods useful for privatizing, or transferring from state ownership to individual ownership, large state enterprises in newly democratic nations.

## BACKGROUND OF THE INVENTION

Among the many tasks necessary to create a successful new world order, after the events of the past several years in Eastern Europe and the former Soviet Union, it will be necessary to transfer ownership rights in substantial portions of some countries' vast state-owned capital stock into private hands. In such countries, as well as others currently lacking effective owner shares markets, it may be desirable to develop policies and tools for operating such owner shares markets. Methods, tools and tasks necessary to accomplish such an enormous economic undertaking, without causing socially destructive economic dislocation is the subject of intense current research. A detailed description of the economic background in which the present invention was developed is contained in Hartnett, William J., "Social Welfare and the Privatization of Large State Enterprises in Newly Democratic nations," incorporated herein by reference, and available from the Barker Engineering Library of the Massachusetts Institute of Technology as Thesis, C.E., 1993, M.S., by author and title. Hartnett, a draft (1992) of which forms British Provisional Patent Specification GB 9222884.0, filed October 30, 1992, also contains detailed descriptions of aspects of specific embodiments of the invention. Relevant portions thereof have been included herein as Appendices A, B and D.

It is a general goal of the present invention to provide computerized market tools

usable in countries which may be lacking market infrastructure. It is a more specific goal of the present invention to make available computerized market tools able to support any privatization policy chosen by government policy makers, including making possible the universal distribution policy outlined in Appendix A.

## SUMMARY OF THE INVENTION

The present invention includes a computerized method of operating a market system, comprising the steps of: providing a computerized knowledge base incorporated in a computer system by which the knowledge base may be modified responsive to user evaluations and user contributions; formulating market system policies and parameters in accordance with contents of the knowledge base after any modifications made by the computer system to the computerized knowledge base; and on a digital computer, executing instructions to consummate market transactions by performing cross-price resolution, according to the policies formulated after any modifications to the computerized knowledge base.

In a variation on the invention, the present invention may further include steps of receiving transaction orders, including portfolio trading delegation orders; and executing trading delegation orders for which cross-price resolution converges, resulting in delegator/delegatee assignments by which a delegator's portfolio is managed by a delegatee.

In a further variation, the invention may include collecting and entering transaction orders into a computer system at a first level of a receiving hierarchy; combining the collected and entered transaction orders into a transaction file, by executing instructions on the computer system; writing the transaction file to at least one physical medium; and sending the physical medium to a second level of the receiving hierarchy.

Another variation on the invention may include steps of collecting and entering transaction orders into a computer system at a first level of a receiving hierarchy; combining

the collected and entered transaction orders into a transaction file; and

transmitting the transaction file to a second level of a receiving hierarchy over an electronic communication network.

In yet another variation, the invention may include a step of receiving orders transmitted electronically by individual users.

The above variations may be combined to form additional variations on the present invention. Additional aspects of the present invention will become apparent to those skilled in the art, on reading the following description.

## BRIEF DESCRIPTION OF THE DRAWING

Like reference numerals indicate like elements in the Figures, in which:

Fig. 1 is an overview flow chart of the privatization process contemplated by the present invention;

Fig. 2 is an organizational block diagram of the inventive privatization process and the tools for implementing the same;

Fig. 3 is a flow chart of updating a policy knowledge base according to one aspect of the present invention;

Fig. 4 is a concept map of the hierarchical structure of an initial knowledge data base for the privatization planner of the present invention;

Fig. 5 is a flow diagram illustrating the formation of a transaction data base for use by the privatization implementation tool of the illustrated embodiment of the present invention;

Fig. 6 is a flow diagram of a process for updating a transaction data base using the privatization implementation tool of the illustrated embodiment of the present invention; and

Fig. 7 is a flow diagram of the logic of the privatization planner embodiment of the adaptive knowledge base tool of the present invention.

## LIST OF APPENDICES

In order to enhance the clarity of the following details of the example embodiments are described in the attached appendices, wherein:

Appendix A is Hartnett (1992), Part I, Chapters 5, 6 and 7;

Appendix B is Hartnett (1992), Part II, Appendices 2 - 5;

Appendix C is a detailed description of the **Privatization PlannerT** operation, commands and knowledge base adaptation method;

Appendix D is Hartnett (1992), Part III, Appendices 1 - 7; and

Appendix E is a description, including screen samples, of the application of the knowledge base system of the **Privatization PlannerT** to a sustainable development application.

## DETAILED DESCRIPTION

The present invention will be better understood in view of the following description, read in connection with the figures. The following description relates primarily to an embodiment of the invention suitable for privatizing a large economy. However, this is merely an example, given for purposes of illustrating the principles of the invention, which may be practiced in a variety of other contexts, some of which are indicated at appropriate points in the discussion. Some details in the following discussion relate specifically to the embodiment disclosed in Hartnett (1992), but may be implemented differently, as seen for example in Hartnett (1993) or Appendix C, yet remain within the contemplation of the present invention.

A basic process of privatization in accordance with the present invention is illustrated in Fig. 1. Various steps in this process are supported by computerized tools, such as will be described below. In order to understand the inter-relationships between the computerized tools, it is first necessary to understand the privatization process contemplated by the present

invention, though the invention is applicable to other processes, as well.

Each enterprise to be privatized is to undergo a process substantially as shown in Fig. 1. The enterprise leadership first prepares a privatization business plan (Fig. 1, Step 101). The plan should include such detailed information as the current productive capacity of the enterprise, the capital stock and labor force of the enterprise, a risk of claimed physical facilities, a demonopolization goal as explained below, a stock compensation plan for board, management and workers of the enterprise, and such other elements as would conventionally be included in a business plan. Subsequently, the privatization business plan is reviewed by a Privatization Board (Fig. 1, step 103).

The Privatization Board has several options by which it may dispose of a privatization business plan. It may disapprove of the privatization business plan, along with reasons for that disapproval. The Privatization Board may approve of a privatization business plan, in whole or in part. The Privatization Board may negotiate with the enterprise regarding a privatization business plan which has been disapproved in whole or in part. Thus, the interaction between the enterprise leadership and the Privatization Board helps to ensure that viable privatization business plans are written and subsequently executed.

Often, the privatization Board will find that a privatization business plan for one enterprise conflicts with a privatization business plan, current or published contemplated future operation of another enterprise. In such a case, the Privatization Board will resolve such inter-enterprise conflicts at the time of review of the privatization business plan.

Finally, in the course of the Privatization Board Review, an effective privatization date 105 is established. Naturally, an effective privatization date is established only for privatization business plans which have been approved.

On the effective privatization date 105, the enterprise begins to execute its privatization business plan. The stock compensation plans described in the privatization business plan are implemented. Periodic financial reporting requirements are enforced.

In accordance with the plans laid out in the privatization business plan, the enterprise begins restructuring (Fig. 1, step 107). The enterprise may also initiate new, private, spin-off enterprises.

When the enterprise leadership has reason to believe that the goal for demonopolization set in the privatization business plan (Fig. 1, step 101) has been met, then the enterprise may submit an application for certification of demonopolization to the Privatization Board (Fig. 1, step 109). The Privatization Board again has the options of approving, disapproving, or negotiating changes to the application. When an application for certification of demonopolization has been approved, then the Privatization Board will establish an effective demonopolization date 111.

On the effective demonopolization date, the compensation stock from the stock compensation plans initiated on the effective privatization date will vest. At this point, privatization may be considered complete (Fig. 1, step 113).

The organizational block diagram of Fig. 2 indicates how the tasks of privatization are divided among the computerized tools which are to be used to implement privatization. The tasks are divided into substantially two groups: planning tasks and transactional tasks.

Planning tasks include the establishment of policy, the formulation of plans, the setting of goals and dates, and the customization of the tools for supporting the transactional tasks. Supporting this aspect of privatization is the **Privatization PlannerT** computerized tool 102. Example screens and source code are included in Appendix B. Operation and commands are included in Appendix C. Research and analysis 203 is performed using this computerized tool, which adapts to changing conditions, as described below. This tool will enable a country's economic leadership to plan privatization policies including the establishment of property rights 205, the formulation of incomes policies 207, structuring the privatization sequence 209, establishing an oversight agency 211 and communications with and within that agency, and customization 213 of the **Privatize!T** computerized tool

215 for management of transaction tasks.

The Privatize!T computerized tool 215 permits the economic leadership of a country to process transactions submitted by portfolio owners and delegatees of portfolio owners concerning the enterprises owned 217, support enterprise polled shareholder voting 219 and support auctions of other state property 221. File definitions, asset types, transactions and commands are described in Appendix D. In performing these tasks, processing centers will generate transaction data bases 223, which are ultimately merged into a single transaction data base for processing. A central computer which processes the transaction data base 225 generates reinvestment transactions 227, establishes valid delegations 229, selects between alternative transactions 231, calculates clearing prices 233 and transmits results to financial institutions 235. The assets permitted to be owned and transactions permitted to be performed 239, by portfolio owners and delegatees are determined during a customization process 213 performed by the economic leadership of the country using Privatization PlannerT. The customization process 213 is also used to establish parameter values 241, such as the period over which transactions will be processed, called the investment cycle period.

The described embodiments of the invention are contemplated as being implemented in a version of the C programming language. This choice yields a number of advantages. The C programming language is a subject of international standards. Therefore, it is suitable for use in various countries. Furthermore, it is extremely portable from one computer platform to another computer platform, without extensive re-coding of modules, except perhaps certain platform-dependent interface modules. Yet another advantage of using the C programming language is that compilers are currently available on most platforms which produce particularly efficient, fast code. This last advantage makes the invention suitable for implementation using PC hardware, when so desired.

The Privatization PlannerT computerized tool is next described. The Privatization

PlannerT is a computerized collaborative knowledge base tool designed to support custom privatization of a country's enterprises. Of course, depending on the contents and organization of the initial knowledge base with which Privatization PlannerT has been initiated, it could be used in any application where it is desired to form a knowledge base which grows and evolves based upon user evaluations and proposed contributions. One such initial knowledge base is illustrated in the concept map of Fig. 4. Examples of such suitable applications of adaptive knowledge bases include: the pursuit of sustainable development, as described in Appendix E; research into avoiding ethnic strife; movie rating systems used in video rental and sales stores; and a literary anthology for which authors are remunerated based on the popularity of their contributions. For example, the embodiment of the adaptive knowledge base invention in a tool to support the pursuit of sustainable development, designated as the Sustainable Development ServerT, is achieved by adapting the identifying contents of the welcome screen, relabeling the name of the tool and subsequent screen displays, and using the same general purpose commands to create a structure of topics and associated pages of information relating to sustainable development. See Appendix E, for examples of screen displays for the Sustainable Development ServerT tool. The documentation of Privatization PlannerT embodiment of the adaptive knowledge base aspect of the invention contained in Appendix C is transformed into documentation for the Sustainable Development ServerT by replacing references to Privatization PlannerT with Sustainable Development ServerT, replacing "ntn" with "sds" and replacing the documentation of the Simulate command with a description of any adaptive knowledge base interface to any tool or tools developed to simulate issues relating to sustainable development. The embodiment of the adaptive knowledge base aspect of the invention in a tool to support research into the avoidance of ethnic strife, designated as the Ethnic Strife ServerT is achieved in a like fashion, and the associated documentation is transformed by inserting Ethnic Strife ServerT and "ess" where appropriate, and by

appropriate adjustments to the description of the Simulate command. It is specifically contemplated that users may or may not be charged fees based upon the amount and nature of their knowledge base access. Contributors may or may not be remunerated based on the quantity, ratings and longevity in the knowledge base of their contributions.

The **Privatization PlannerT** tool is implemented as a software program running on either one or more individual portable or personal computers in the hands of individual users or user groups, or accessible on electronic networks, including a worldwide network such as Internet. Individual users possess copies of relevant portions of the knowledge base for use with their copy of the tool. See Interest command in Appendix C. The knowledge base of the **Privatization PlannerT** tool is modified and updated based on evaluations entered by users of the **Privatization PlannerT** tool. See Fig. 3.

The user evaluation cycle illustrated in Fig. 3 begins with users evaluating and proposing contributions (step 301) to the topics, subtopics, pages and organization of the knowledge base segment in their possession. The segments are then integrated (step 303) by a knowledge base coordinator operating a copy of the **Privatization PlannerT** tool to form a complete knowledge base containing the integrated whole of the knowledge base segments previously possessed by the individual users. Next, the pages are scored by the **Privatization PlannerT** tool (step 305) in accordance with the method described in Appendix B. Page scores are compiled into subtopic scores (step 307) and subtopic scores are compiled into topic scores (step 309). Making decisions in accordance with the scores obtained in the previous steps, the **Privatization PlannerT** tool adjusts the content and organization of the knowledge base (step 311) as described in Appendix B. The adjustments are base upon some form of optimization of the scores obtained above. Finally, individual segments are generated and distributed in accordance with the user preferences (step 313).

Users may customize their usage of the tool (see Customize command in Appendix C), and can effectively access even very large numbers of entries using sophisticated

keyword techniques (see Keyword command in Appendix C), and by filtering and sorting entries using date, evaluations by other users, and evaluations of the user himself using either actual evaluations or estimates based on past correlations or anti-correlations with other users (see Order command in Appendix C). **Privatization PlannerT** also provides and interface to a simulation of the **Privatize!T** computerized marketplace, allowing users to simulate portfolio transactions and asset prices using the methods contained in the **Privatize!T** tool. See Simulate command, Appendix C.

The **Privatization PlannerT** computerized tool permits distribution of segmented or partial knowledge data bases, based on individual preferences. The knowledge base may be distributed in whole or in part over a network or on such physical distribution media as diskettes and CD ROM.

After each user of the knowledge base has entered comments and evaluations to their own satisfaction, the segment on which they are in possession is returned through the network or physical media distribution channel to a knowledge base coordinator. The knowledge base coordinator merges the knowledge bases of all users into a single large knowledge base on a regular basis. The results of the various users' evaluations of entries in the knowledge base are then used by the **Privatization PlannerT** adaptive mechanism to eliminate entries which are of insufficient interest or value to users.

Although the adaptive function has been thus far described in connection with entries, or information content, the structure of the knowledge base is also subject to user evaluation. A knowledge base is organized into topics, which have both content and organization. Furthermore, evaluations are graded on both on quantity and quality. That is, an entry or topic organization evaluation consists of both the amount of information associated with that topic and the value of the evaluation given by each user. The scoring of the evaluations according to one embodiment of the present invention is discussed in detail in Appendix B.

Privatize!T is a computerized tool to support free markets in newly democratic nations. The tool is capable of implementing any privatization policy chosen by government policy makers, and in particular includes a capability to support distribution of shares in large state enterprises to an entire citizenry. Universal distribution of at least a portion of public assets, such as large state enterprises, can completely avoid the need to value such assets prior to privatization. This is advantageous in developing economies without any adequate means of achieving such valuations. It is also advantageous in and applicable to developed economies because it can avoid the large absolute inefficiency associated with even a modest relative underwriting valuation error. Legislation or a decree can vest in each citizen privatization rights in the form of Stock Market Units (SMUs). SMUs are a way to aggregate rights to equity in state enterprises into a current private asset, by defining a new financial instrument composed of one share in each enterprise due to be privatized over a fixed interval. While normally the fixed interval will begin on or immediately after the date of legislation and terminate at some future date certain, it is also possible to define intervals which are completely in the past or which are completely in the more distant future. For example, if the main SMU were defined to extend from the date of legislation to the end of the subsequent year, then a SMU2 could be defined to begin at the termination of the fixed interval of the SMU and continue for an additional year or more. SMUs can be immediately and freely traded. In particular, a citizen's right to a SMU allocation can be used in bidding for small state enterprises at once, even before implementation of the entire system. The Privatize!T tool solves the problem in newly democratic nations that a stock trading infrastructure must quickly be provided to execute market transactions in the absence of a significantly developed communication and financial intermediation infrastructure. Thus, it is a particular feature of Privatize!T that the files and methods used may be efficiently implemented using minimum hardware and in the absence of an advanced infrastructure. For example, communications are contemplated as performed using physical

transfers of information on diskettes, tapes or other physical media when sophisticated telecommunications happen to be lacking. Similarly, the market resolution methods are suitable for implementation on personal computers (PCs) as well as large mainframes.

Other assets contemplated as being traded in accordance with the **Privatize!T** embodiment of this aspect of the invention include stock or debt in specific enterprises, debt of governments or financial institutions, foreign currency, price level adjusted mortgages, in addition to flexibly specified annuities which are keyed to standardized actuarial tables and priced according to their implicit interest rate. This aspect of the present invention has many other useful applications. For example, assets such as natural resource rights in Bahrain, air pollution rights in the United States, or the proceeds of a South African wealth tax collected either in the form of money or "in kind" such as in the form of stock, could be vested in a very large number of recipients or an entire citizenry, and a marketplace with an extremely broad investment opportunity set provided by this system. Appropriate bids and offers for any available asset can be made by any entity with an account on the system, including governments, organizations and individuals. One objective of this aspect of the invention is to provide a "springboard" to free enterprise in the context of a free market.

The tool also supports the creation of a "social security" account for each citizen, for example initially endowed with a supplemental allocation of Stock Market Units or newly privatized stock in individual enterprises by means of universal distribution. This can be a very attractive capability even in developed market economies where large state enterprises are to be privatized but policy makers wish to strengthen the social safety net in the process. The regulation of such social security accounts can specify that the Stock Mark Units in these accounts can only be exchanged for government debt, lifetime annuities or other specified assets, but with immediate distributions when necessitated by hardship. Such regulation of social security accounts is supported in the **Privatize!T** tool. See, for example the Security transaction, Appendix D. Additional allocation of Stock Market Units

can be made to social welfare accounts of local governments in an amount corresponding to the number of citizens liable to be missed, for example due to homelessness. The result is a strengthening of the "safety net" for social welfare.

**Privatize!T** supports the market for enterprise shares in a variety of ways such as dividend payments, stock subscriptions and "going private." It also provides subsets of shareholder lists for shareholder votes based on polling techniques. An embedded marketplace for the delegation of authority to professional investment organizations at competitive rates is included in the **Privatize!T** tool to facilitate efficient markets and price discovery. These features of the market tool are additional examples of capabilities which can be valuable in developing and developed economies alike. It is specifically contemplated that users of the **Privatize!T** tool may or may not be charged fees based on the amount and nature of their usage of the system.

The operation of the **Privatize!T** tool is now described in connection with Figs. 5 and 6.

The investment cycle begins with the input of transaction data into a hierarchical system of computers. This phase is complete upon the production of a comprehensive and sorted Transaction Data Base (XDB). This is composed of blocks containing all transaction data for a given entity, and sorted by ID code, for example as discussed in detail in Appendix D. This data base is then processed by means of five passes, in order to implement delegations as appropriate, establish asset prices, execute transactions as appropriate, and transmit the results to custodial financial institutions.

**Privatize!T** is a general system capable of supporting a broad range of policy choices. It works in tandem with **Privatization PlannerT**, which provides a collaborative knowledge base in support of policy formulation. Policy choices such as the allocation of Stock Market Units to the citizenry will often be implemented by appropriate governmental transaction input to the **Privatize!T** tool. Regulation such as the maximum number of

transactions an individual or organization is allowed to submit, and technical specification such as the choice of field delimiters, are used to adapt modules such as GLOPARM as appropriate. For more information on the customization process, refer to Appendices B and C.

The Transaction Data Base (XDB) is prepared as illustrated in Fig. 5 using module Transact (XACT). Module XACT requests the input devices, which can include the terminal and auxiliary storage such as floppy disk or tape drives. The operator also specifies the output device and the size of any random access disk file available for sorting.

As XACT reads transaction blocks from one or more input devices, it performs initial validity checks. If an error is found in the input from the terminal, the operator can immediately correct the transaction block, in addition to making any appropriate notation on the input forms. If an error is found in input from another device, the operator can enter additional transactions to cancel out the error and introduce a corrected substitute transaction.

Module XACT performs merge-sorting into main memory on the transaction blocks read in. XACT notifies the operator when it stores a sorted memory buffer onto disk, and when it merge-sorts any disk files to the output device. If a disk is unavailable, the sorted memory buffer is stored directly onto the output device. XACT provides the operator an opportunity to change the diskette or tape after each output cycle. This allows the output to be subsequently merge-sorted if multiple input devices are available.

The resulting diskettes or tapes are transmitted to the next higher node in the hierarchical network of processing centers either physically or electronically. For example, the network illustrated in Fig. 5 includes local, regional and central nodes. At the central computer facility, the operators generate a single comprehensive sorted XDB by iteratively merge-sorting the input. XDB should then be backed up and archived off-site. Throughout the process, the operators preserve the physical break-points in the series of tapes which

correspond to the logical subdivision into categories of portfolio owners such as governments, enterprises and citizens.

As shown in Fig. 6, processing the Transaction Data Base (XDB) involves running a series of modules at the central computer facility. Detailed definitions of the files processed and the functions of the modules are contained in Appendix D. Module Delegatee Order File Generator (DORFGEN) is run on the delegatee-organization subset of the XDB to create the random access disk file Delegatee Order File (DORF). Upon creation, file DORF should be backed up, to archive and to recover from processing disruptions. Likewise, module Enterprise File Generator (EGEN) is run with interactive input to create and maintain the random access disk file Enterprise File (EPRISE), which should also be backed up.

The operator then runs module PASS1. PASS1 first requests the tapes for the enterprise segment of XDB to update dividend information in EPRISE, which should then be backed up. PASS1 then requests the entire XDB tape series, generating the serial file ORDERS #1 and an updated version of XDB containing reinvestment transactions. It then requests the tapes comprising ORDERS #1 so that module PRICING can calculate price estimate #1 and post it to random access files EPRISE and PRICES. The operator should back up EPRISE and PRICES, and then archive them, ORDERS #1 and the original XDB.

The operator next runs module PASS2, which requests tapes comprising the updated XDB, and generates the serial file Delegation Offer File (DOFF) and a lending report. The lending report may be distributed to selected potential large borrowers, who are given a brief opportunity to update their borrowing transactions. Any new borrowing transactions are input to module XACT, along with an appropriate subset of XDB including, for example, only the government segment and perhaps financial institutions or even other enterprises. Module XACT generates a new XDB subset, and the operator archives the subset being replaced. The operator then runs module Delegatee Compensation

(DELCOMP) which requests the tapes comprising DOFF, and generates the random access Delegatee Order File (DORF).

Module PASS3 is run next. It requests the XDB tapes and generates the serial file ORDERS #2. PASS3 then requests the tapes comprising ORDERS #2 so that module PRICING can calculate price estimate #2 and post it to random access files EPRISE and PRICES. These files should then be backed up and archived.

The operator next runs module PASS4, which again requests the XDB tapes, and generates the final serial ORDERS file. It then requests the final ORDERS and posts the subsequently calculated final prices to files EPRISE and PRICES, to be backed up and archived.

In the final complete pass, the operator runs module PASS5 which requests the XDB tapes, generates a final updated XDB file, and also generates serial file Disposition File (DF). The intermediate set of XDB tapes should then be archived.

Module DISPOSE is then run, which requests the DF tapes and the financial institution segment of XDB. Module DISPOSE then generates a combination of reports and tapes or diskettes for transmittal to custodial financial institutions. A copy of these transmitted files and the input DF tapes should then be archived.

The above sequence of processing steps is described from the perspective of an operator of the computerized market tool. Following is a description of the internal logical steps accomplished by that tool. Initially, a sorted and comprehensive Transaction Data Base (XDB) is assumed to be available. After first updating the Enterprise File (EPRISE) with dividend information, module PASS1 executes the first complete pass through XDB assuming all offers to delegate in excess of the delegatee-specified minimums are consummated. At this point, the serial XDB file may be very large. PASS1 reads the serial XDB and the random access Delegatee Order File (DORF), which is typically much smaller than XDB, by calling XBLOCK, which in turn invokes modules ORDERS and

PRICE, to generate an initial approximation of asset prices. In the process, PASS1 generates a new copy of XDB containing ACQUIRE transactions allocating portfolio earnings based on any REINVEST transaction or default.

In a second pass, module PASS2 uses those approximate prices to value portfolio assets. Asset valuations are used to approximate the total amount of offers to lend to each entity, by maturity and interest rate. This information is made available to potential large borrowers to provide them with a brief opportunity to update their bids to borrow money, as expressed in appropriate ACQUIRE transactions. These transaction updates are input to XACT to update the XDB. This does not necessitate a full pass through XDB, but only those tapes containing transaction data for potential large borrowers, i.e., governments, and perhaps financial institutions or enterprises, as discussed above. The second pass asset valuations are also used to create a Delegation Offer File (DOFF) of all offers to delegate. Module DELCOMP sorts DOFF and then calculates the two compensation thresholds for each delegatee by asset amount and earnings in accordance with the embedded marketplace for investment authority.

Module PASS3 uses the delegatee compensation thresholds to determine which delegation offers are actually consummated, and generates a second approximation of asset prices.

During the fourth pass, PASS4 uses the second approximation prices to determine whether to use a price-dependent ACQUIRE transaction or an available alternative specified in an immediately following ELSE transaction. Since the second pass prices were still approximations, the price dependencies of ACQUIRE transactions must also be understood as being approximate. The prices generated upon completion of this third pass are final prices "as of" the investment cycle date.

Module PASS5 conducts a fifth and last pass to execute transactions as appropriate, update portfolio valuations, and create a Disposition File (DF) containing records of assets

to be dispensed by custodial financial institutions.

The Disposition File (DF) is input to module DISPOSE which sorts it and outputs a tape/diskette and/or report of the appropriate records for transmission to each financial institution. Each financial institution in turn notifies the individuals or organizations entitled to the proceeds of consummated transactions, and makes funds available as scheduled, either as a principal or as an agent of the government, depending upon its category.

It should be noted that the above description is based on an investment cycle, rather than continuous order matching. This is to permit the tool to be operated using minimal computer, communications and financial intermediary infrastructure when privatization is first begun, without sacrificing any significant features of a fully developed market resolution system. However, this tool can also be used as a real-time market system by reducing the period of the investment cycle from months, weeks or days to a brief interval defined by a sufficient number of newly-submitted transactions to ensure sufficiently well-behaved characteristics of the pricing behavior of a sufficient subset of the supported assets.

The batch mode investment cycle is adapted to a real-time system in a straightforward manner. The generation of the sorted and comprehensive Transaction Data Base XDB using transported physical media and off-line terminal entry described in Fig. 5 is replaced with real-time transaction entry into an electronic network which channels the submitted transactions to a central computer. The electronic network may be implemented hierarchically, with each level in the network consolidating inputs into smaller numbers of outputs, finally producing a transaction file on the central computer. It is possible to use the Simulate command of the **Privatization PlannerT** tool implemented on an electronic network with appropriate security precautions to provide an input interface into even an actual, rather than simulated **Privatize!T** system.

The central processing is then expedited for real-time responsiveness by: 1) sequestering modules such as AUCTION and EVOTE which have no inherent need to

participate in a real-time market, even though they too can be more useful being implemented as part of a responsive electronic network; 2) deferring, as appropriate, relatively time-insensitive transactions such as BANK, DELEGATE, DIVIDEND, GRADE, JOIN, LEAVE, OVERSIGHT, PERCENTAGE, REINVEST, TRANSFER, WHEN, for example to off-hours processing on a daily cycle; 3) aggregating the assets under delegated investment authority into a composite synthetic portfolio for each delegatee-organization, able to be partially or completely segregated into individual portfolio-owner accounts either periodically or as needed; 4) relocating information storage to speed access by taking advantage of the smaller absolute quantities of data being processed over shorter intervals, for example relocating the Transaction Data Base XDB from high capacity tape to disk, and relocating files such as PRICES and ORDERS from disk to main memory, along with periodic archival of such files to higher-capacity media; 5) configuring a powerful real-time central computer or set of computers, and in addition optionally exploiting parallelism inherent in the task, such as transaction front-end preprocessing, asynchronous period-sampling as described below, or any element of first-approximation independence of separate asset prices -- for example, one processor could be the initial co-recipient of all transactions involving government debt, along with the one or more processors designated as the initial recipient of one or more other assets involved in the exchange; and 6) in addition, the amount of processing power required to achieve convergence of price estimates is reduced because the initial price estimates, which are set equal to the most recent prices, will normally be closer to final price estimates over shorter intervals. The above-mentioned modules are described in detail in Appendix D.

Successful convergence is determined by analyzing the pattern of final asset price estimates over a sequence of sampling periods which each start at the end of the previous investment cycle but successively add an additional very small interval measured either in time or quantity of newly-arrived transactions, as adaptively optimized, but at least equal to

the amount of time needed to complete the process of price estimation for the previous period unless parallel processors with shared information asynchronously sample cumulated transactions.

The price estimate for an asset converges sufficiently when the deviation between the previous price and the price estimate for the first sampling period, or between the price estimates for a number of successive sampling periods, is within acceptable bounds based upon recent experience with that asset. A new investment cycle is closed when a sufficient number of asset prices converge. Transactions involving only assets whose price estimates have converged are executed, being consummated if their price conditions are met, and being retained for inclusion in future cycles if not -- unlike the default operation in batch mode operation, described above. Transactions involving assets whose prices have not converged are retained for inclusion in future cycles. Transactions involving only assets whose price estimates have converged in the above sense include ACQUIRE transactions, even if an associated ELSE transaction refers to non-converged assets, but exclude ELSE transactions if an associated ACQUIRE transaction refers to non-converged assets.

Transactions entered into the real-time system can incorporate a field containing a "good 'til canceled" (GTC) flag or a "good until" time which specifies the time at which the transaction is to be cancelled, with the default normally being cancellation at the end of a normal daily market cycle. It is also possible for transactions entered into the real-time system to incorporate a "stop price" which triggers the transaction to be executed "at the market" at any available price. However, the expected best method of implementation, at least in markets without sufficient liquidity, is to not allow "stop" orders or "market" orders, but rather to require each price order to have a "limit price" which must be at least satisfied before the transaction is consummated. Note that like in real-time mode, batch mode regulations may constrain the usage of "market orders" or constrain prices by setting "price limits" over time intervals beyond which transactions are not allowed to be

consummated.

The system promotes the liquidity needed for a successful real-time system. Owners of portfolios have access to an effective tool to continuously bid and offer assets as desired. The government or individual enterprise can continuously offer debt or indexed debt, adjusting the offered price, i.e., interest rate, and offered quantity as desired. The government and approved financial institutions can continuously offer annuities, also adjusting the offered price, i.e., the implicit interest rate, and offered quantity as desired. The government can post standing offers of blocks of shares of enterprises in which it wants to increase private holdings at prices it is able to continuously adjust, and can place standing bids for enterprise shares if it chooses to support those share prices or buy back shares at price levels it considers unrealistically low in a market sense or unacceptably low in a policy sense. Enterprises are able to market blocks of their shares to the public, to bid for blocks of their shares, for example in a "going private" process or as part of corporate finance strategy, or to engage in trading in other enterprise shares as allowed by any governing regulations. Enterprises may offer new shares intended to raise capital, or may offer with government approval shares held by the state.

Delegatee-organizations are able to function anywhere on the temporal investment spectrum consistent with their representations to the public in their disclosure documentation, including position trading, day trading and scalping. Since delegatee-organizations will be highly motivated to maximize either their total investment return or their assets under management, there are strong incentives for them to find, exploit and in the process reduce inefficiencies in price discovery among the various assets on the system, including SMUs and individual enterprise stocks. In addition, it is possible for the government to encourage market-makers pledged to enhance liquidity in specific assets by various incentives, such as favorable tax treatment of income, or delegations of possibly large blocks of government assets including the particular assets for which the market-maker

has assumed some responsibility, conditioned upon their performance in achieving objectives such as helping stabilize price trajectories or marketing state-owned assets to private investors.

Even individual portfolio owners with access to an effective electronic network will be able to submit real-time transactions. For example, if the French government vested parts of large state enterprises in the entire citizenry, individual citizens could access the **Privatize!T** tool through a network like Minitel.

This promotion of liquidity by the system not only improves the prospects for a successful real-time marketplace, but also improves the character of the marketplace in batch mode. In fact, the two modes are not inconsistent. The real-time mode provides a very broad and virtuously continuous investment opportunity set to a set of sophisticated market participants, even relative to modern market economies, and the batch mode provides periodic low cost access to the marketplace to a broad cross-section of citizens with a typically longer investment horizon.

A more detailed discussion of the logic of the method embodied in the **Privatization PlannerT** aspect of the invention is now given in connection with Fig. 7. The **Privatization PlannerT** tool is an event-driven tool, which executes a loop as now described.

The tool first enters a state of awaiting a user's command (step 701). When a command has been entered, and confirmed if so required by a particular embodiment, then the tool parses the command entered (step 703) to determine which of several alternative actions to next branch to (step 705). In the C programming language, this action is commonly embodied in a **CASE** statement. Next, the action required by the parsed command is performed (step 707), after which control returns to the step of awaiting a user's command. The functions in one embodiment of the various commands and steps performed thereby are described in detail in Appendix C, however other embodiments

including somewhat different command sets and internal command logic are contemplated as within the scope of the invention. Each of the commands implemented in the described embodiment is invoked by a user by entering the reference designator of the branch from the step of branching (step 705) to the desired command action (step 707).

Having now described a few embodiments of the invention, it should be apparent to those skilled in the art that the foregoing is merely illustrative and not limiting, having been presented by way of example only. Numerous modifications and other embodiments, including combinations of features found in the illustrated embodiments, are within the scope of one of ordinary skill in the art and are contemplated as falling within the scope of the invention as defined by the appended claims.

What is claimed is:

## Chapter 5. Universal Distribution: Potential Questions

So far, other distribution schemes have been favored over universal distribution. In Poland, only 30% of shares are allocated to the citizenry, and even those are through financial intermediaries, 30% is reserved for Polish or foreign investors or the treasury, 20% goes to pension funds, 10% to commercial banks and 10% to enterprise employees.[58] The Russian privatization program provides preferential options to workers and management for roughly 40-50% of the capital of an enterprise, with an as yet undetermined portion of the balance distributed by vouchers.[59]

The conventional wisdom is that universal distribution is a "non-starter" policy because of the need to accommodate stakeholders, the need for external discipline over management and the board of directors, and the difficulties of quickly achieving either privatization business plans or truly general individual ownership. It is therefore necessary to carefully consider each of these questions.

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[58]Republic of Poland, supra note 55 at 10.

[59]See Chapter 8.

A. How Should Stakeholders be Accommodated?

An enterprise by its nature involves stakeholders such as employees, pensioners, banks, creditors and local governments. By definition, business systems evolve an accommodation between stakeholders and enterprises – otherwise the class would not be considered a stakeholder. In most states, business systems are embedded within a matrix of more or less clearly defined legal rights and customary practices. Such an infrastructure of law and custom is not yet in place in newly democratic nations. One line of reasoning then concludes that it is necessary to accommodate stakeholders by distributing to them an interest in ownership.[60]

However, blurring distinctions among stakeholders is counterproductive. The shareholders have ultimate control over an enterprise, and are entitled to its residual value. If all stakeholders were to be accorded this status proportional to their financial interest and political clout, then enterprise ownership would become a crazy-quilt patchwork of national and local governments, banks, creditors such as other enterprises, institutions, investors, board members,

[60]D. Lipton, J. Sachs, "Creating a Market Economy in Eastern Europe: The Case of Poland" p. 130, Brookings Papers on Economic Activity (Spring 1991).

management, workers, and the general citizenry. Such an outcome would impose significant opportunity costs on household wealth and individual welfare. Unless the accommodated stakeholders usurp a sufficiently great windfall, this could even degrade their own welfare relative to more appropriately tailored financial support, by narrowing their portfolio and increasing its riskiness.

The classic example of a stakeholder is the enterprise employee. One concern has been that workers unplacated by a sufficient ownership interest might sabotage an enterprise or otherwise thwart its privatization. However, once a decisive resolution to the allocation of ownership is reached, with a schedule to phase out enterprise subsidies, it is difficult to see how a worker would benefit by jeopardizing the source of his or her paycheck. A similar concern is that workers might quit to form their own company, in some form of "spontaneous privatization." To the extent such a process merely carries on the same business with the same clientele and capital equipment, it could be declared illegal and subject to the restitution of all subsequent profits to the state. However, to the extent that manpower is drained from inefficient, bureaucratic or monolithic organizations to new enterprises responsive to

current market demands, that is a healthy process of "creative destruction."

Another common argument is that distribution of enterprise shares to employees is necessitated by their clout.[61] But workers of industrial enterprises can be replaced if their demands become inequitable, especially during an economic depression with collapsed demand and increasing unemployment. Also, industrial workers represent only a small fraction of the citizenry. In Poland, such workers are only 30% of the labor force, and represent about 15% of the population.[62] In the former Soviet Union, the largest 44,000 industrial enterprises employed about 35 million workers, representing only 12% of its population.[63] In fact, worker ownership amounting to management control is a potential hazard which can degrade enterprise performance.[64]

The allocation of stock to workers who happen to be employed at an enterprise on the date of its privatization is inadvisable, because it concentrates wealth randomly (see Appendix 1). However, an ongoing stock compensation plan for employees can be a legitimate component of compensation negotia-

[61]E.g., S. Fischer, supra note 33 at 5-6.
[62]D. Lipton, supra note 60 at 128.
[63]Estimates from graph in IMF, et al., 2 "Study of the Soviet Economy" 37 (Feb. 1991).
[64]H. Hansmann, "When Does Worker Ownership Work? ESOPs, Law Firms, Codetermination, and Economic Democracy", 99 Yale L. J. 1749, 1816 (1990).

tions. Unlike the effectively random initial conditions of profitability as determined by a history of central planning directives, enterprise performance after privatization and hard budget constraints take effect will be strongly correlated to employee performance. In sum, the best way to accommodate enterprise employees in particular, and stakeholders in general, is to design a process of privatization which maximizes the prospects for the success of the enterprises in which they hold stakes.

B. Will the Board of Directors and Top Management Act in the Interest of Shareholders?

i. Background

Another common objection toward universal distribution to the entire citizenry is that it would dilute ownership rights so as to preclude effective control over the board and management of an enterprise.[65] The theory is that shareholders elect a board of directors accountable to them; the board of directors establishes broad policies and strategies, and appoints and over-

[65]E.g., O. Blanchard, supra note 34 at 40-41, 44; S. Fischer, supra note 33 at 19; B. Djelic, "Privatization and Corporate Governance in Eastern Europe: The Case of Yugoslavia", Harvard draft p. 12 (Dec. 8, 1990); R. Frydman, supra note 38 at 34.

sees the chief executive officer (CEO) and perhaps other top management; the board of directors and top management have a collective fiduciary duty to conduct the affairs of the corporation in the best interests of the shareholders; top management hires officers which can speak on behalf of the enterprise; officers hire non-officer employees who can in turn form a supervisory hierarchy. If the results are unsatisfactory in the context of the competitive marketplace, then the board of directors is expected to remedy the situation – if necessary by replacing top management. If the board of directors fails to adequately serve the shareholders' interests, then the shareholders in turn elect different directors.[66]

However, in reality the responsiveness of a western corporation to its shareholders is often inadequate. A series of common corporate tactics can entrench management and dilute effective shareholder control: inside directors (members of management also serving on the board of directors), golden parachutes (lucrative termination clauses in management employment contracts), proxy fights (management waging battles over shareholder votes ad-

[66]For an excellent review of the methods to discipline management and the board (e.g., earnings incentives, relative performance evaluation, career concerns, stock market monitoring such as takeovers, and creditor controls such as bankruptcy) see J. Tirole, supra note 51 at 7-9.

versely affecting its position) and poison pills (unpalatable corporate changes automatically triggered by a successful takeover).[67] The disciplinary backstop is the capital marketplace, but takeover premiums of typically 50% demonstrate the insulation enjoyed by management.[68]

ii. Control by Shareholders

Shareholder control over top management and the board of directors in the context of extremely widespread shareholdings can be facilitated by several policy choices: the modulation of corporation law, shareholder voting using polling techniques and the delegation of authority. Corporation law can reflect widespread shareholdings in several ways. To promote representation on the board by minority factions, directors can be elected by cumulative voting without unnecessary classes. Voting quorums can be set at low levels. Tender offers to take enterprises private can be encouraged by reducing the required thresholds of shareholder approval.

Shareholder votes can also be implemented with polling techniques. For a

[67]D. Hallberg, "Top Cats", Reason 42-43 (May 1992).

[68]J. Goodman, G. Loveman, "Does Privatization Serve the Public Interest?", Harvard Business Review p. 9 (Nov./Dec. 1991).

given decision, the enterprise would determine what percentage ownership represents the threshold between large and small shareholders. It would then submit the decision to each of the large shareholders, and a number of small shareholders selected at random. Each large shareholder vote would be weighted according to the number of shares voted, while each small shareholder vote would be weighted equally according to the total amount of small shareholdings divided by the number of small shareholders selected. However, the probability of a particular small shareholder being selected would be an increasing function of the number of portfolio shares. Statutes and regulations can specify maximum thresholds and minimum polling sample sizes as a function of the size of the enterprise and the importance of the decision.

Shareholder control can also be concentrated by delegation of authority. Delegation of investment authority can provide market discipline as delegatee-organizations perform investment research resulting in the sale of shares of under-performing enterprises. Sales of a particular enterprise's shares would tend to depress the share price, reducing the value of compensation shares to the management or workers. Recipients of compensation stock in well-

performing enterprises would likewise be rewarded by share purchases increasing the stock price. Delegation of voting authority can also concentrate shareholder control by serving as an on-going and comprehensive "proxy" delegation.[69]

iii. Alignment of Interests via Compensation

Another very powerful way to align the interests of shareholders, top management and the board of directors is to tie executive compensation to the stock market valuation of the enterprise. The idea is to determine by statute that a CEO's annual compensation is a fixed multiple of national average wages, plus a fixed percentage of total outstanding shares to be issued from the enterprise treasury (see Appendix 2). Corresponding formulae for the board of directors, president and perhaps executive vice-presidents would be incorporated into the privatization business plan. This approach can be characterized as an emergency incomes policy designed to align the interests of the board and management with the interests of the shareholders. While incomes policies are generally defined to be anti-inflation devices, the sense

[69]At the extreme, a distinct power to delegate voting authority could have national political significance. For instance, each Italian worker-cooperative is affiliated with one of three associations, each of which is connected with a national political party. H. Hansmann, supra note 64 at 1795.

of curbing exploitation of inherent market power would apply here.[70]

Stock compensation would begin upon the privatization date specified in a business plan approved by some sort of Privatization Board. Vesting of accrued shares would occur only upon certification by the Privatization Board that any demonopolization goal which it had stipulated had been achieved. To further reduce the possibility of monopoly rent accruing to management or the board, the Privatization Board could confiscate a percentage of accrued compensation shares corresponding to its estimate of the proportion of the enterprise market valuation which arose from monopoly rent subsequent to privatization. An exception would be that no confiscation would be allowed if demonopolization were achieved within a "safe-harbor" time interval. To encourage successful spin-offs in the process of demonopolization, the motivation to retain as large as possible a stock market base should be reduced. Therefore, a spin-off should pay a corresponding cash bonus to its parent's board and management team (as of the spin-off date), by issuing and selling on the market its own treasury stock. Statutory compensation stock would eventually be terminated by individual enterprises by the choice

[70]See generally, A. R. Braun (IMF), "Wage Determination and Incomes Policy in Open Economies" pp. 3-4 (1986).

of a sufficient plurality of shareholders.

To complement a statutory incomes policy for CEO annual compensation, the alignment of the interests of the board of directors and the rest of management with shareholder interests via compensation can be operationally achieved in the privatization business plan for each enterprise.[71] Allocating the non-CEO portion within the privatization business plan would preserve the flexibility to adapt the compensation plan based on the number and stature of directors and executive vice-presidents. Those executive vice-presidents would also be ideally placed to become CEOs of spin-off companies, as enterprises transform from "u-form" to "m-form."[72]

Any inclination to begrudge compensation as a percentage of stock market valuation for even very large firms should be resisted. Enterprise size is not a definitive determinant of stock market valuation. For example, the stock market valuation of 17-year-old Microsoft, with 10,000 employees and sales of

[71] For a brief but cogent perspective on CEO compensation relative to other top executives, see J. Lorsch, id. at 136.

[72] "U-form" refers to unitary-form, with organization-wide manufacturing, finance, marketing and sales departments. "M-form" refers to a multi-divisional organization along broad product lines which would facilitate spin-offs. See generally, E. Pavlik, supra note 142 at 45-51. But see J. Vickers, G. Yarrow, "Privatisation and the Natural Monopolies" 49 (1985), where it is argued that restructuring of monopolies should precede privatization.

$1.8 billion, is now as great as that of the world's biggest manufacturer: 84-year-old General Motors with 766,000 employees and sales of $124 billion.[73] This is because the stock market more or less reflects the present discounted value of the expected stream of future, after-tax earnings. The boldness and initiative of top management, which would be strongly encouraged by unlimited upside potential, will play a vital role in determining which enterprises become highly valued and which ones fail. While .01% of stock as a component of annual compensation can strongly motivate the CEO of a very large enterprise, it is a very small price indeed relative to the potential return to shareholders.[74]

C. Can Privatization Business Plans be Generated Quickly?

i. The Potential for Resistance

One concern is that privatization business plans just won't happen, due to

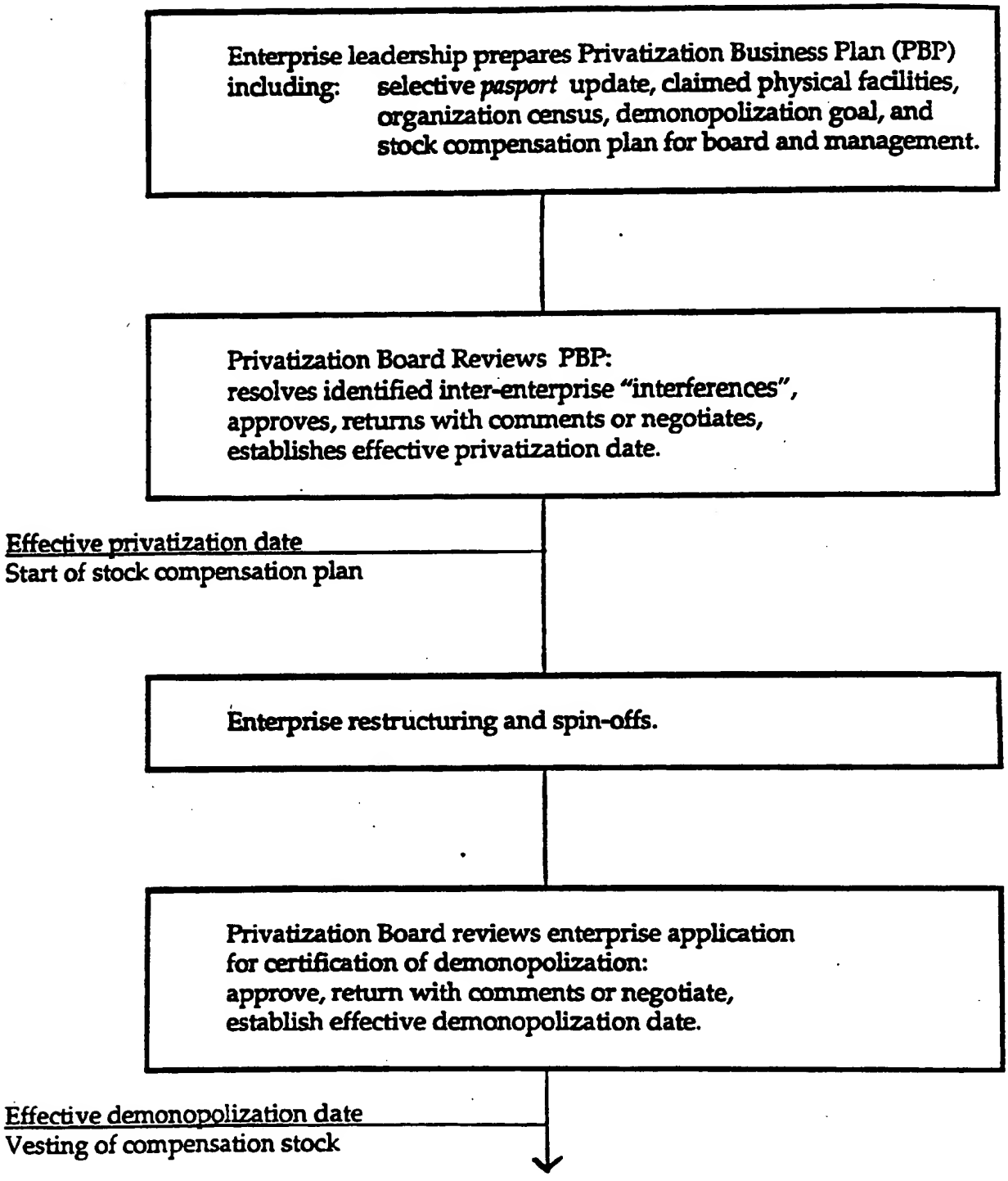
[73]323 (no. 7753) Economist 15 (Apr. 4, 1992).

[74]For example, the median annual average return from 1977 to 1987 of investors in the Fortune 500 largest U.S. industrial corporations was 14.1%. 117 (No. 9) Fortune D26 (Apr. 25, 1988). Note also that more of the earnings would likely be distributed as dividends than in the west. For example, in 1988, the 1000 largest U.S. public companies had a cash flow of $1.6 trillion, but less than 10% was distributed to shareholders as dividends or share repurchases. J. Goodman, G. Loveman, supra note 68 at 9.

resistance. However, the enterprise leadership responsible for preparing the plan would presumably be heavily represented in the subsequent treasury stock compensation pool. It would therefore be highly motivated to rapidly achieve the privatization and demonopolization milestones – stock compensation "start" and "vesting" respectively (see Figure 1). Since the enterprise leadership is capable of providing incentives or disincentives to key employees even in the preparation phase, resistance can be minimized.

Indeed, a healthy tendency may arise for relatively dynamic managements to rapidly formulate business plans including contiguous and desirable organizational subunits before they are claimed by a potential competitor. There may be a corresponding "spontaneous liquidation" of undesirable and unclaimed interstitial organizational subunits. Therefore, dynamic management teams enthusiastically supportive of privatization will tend to acquire control over the salvageable portions of the organizational infrastructure. In the meantime, maladaptive state enterprises will atrophy as subsidies are phased out and already-privatized enterprises refuse to imprudently extend credit. As a consequence, both the markets and the production factors of maladaptive state enterprises will become available to the private sector.

Figure 1: Privatization Flow Chart



ii. The Practicality of Privatization Business Plans

Another concern is that it could be impractical to quickly generate privatization business plans. This issue can be analyzed by exploring what such plans should contain, and how they can be generated. The privatization business plan should contain a selective update of currently available information,[75] a list of claimed physical facilities, and a comprehensive if provisional organization chart including all available names. The generation of such privatization business plans is potentially a highly leveraged focal point for international assistance. Western academics, businessmen, lawyers or accountants, assisted by students or trainees in related fields, could provide guidance along with access to portable computers and menu-driven software for expedited diskette submittals.

The privatization business plan should also attempt to identify potential "interferences", or potential boundary disputes with other enterprises.[76] The

[75]For example, in the ex-Soviet Union, the *pasport* was a collection of thirty-nine forms detailing the productive capacity, capital stock and labor force of an enterprise. Each enterprise there has been required to complete an annual *pasport* since about 1980. E. Hewett, "Reforming the Soviet Economy: Equality versus Efficiency" p. 136 (1988).

[76]The use of patent law terminology is intentional, since the privatisation business plan serves to stake a claim over a part of the industrial infrastructure, just as a patent stakes a claim to intellectual property rights.

full disclosure of such potential interferences would help demarcate inter-enterprise boundaries. The enterprise making the disclosure would be rewarded by a stronger presumption of validity for an approved business plan. Otherwise, a conflicting privatization business plan filed within a certain period of time by a "contiguous" enterprise might possibly be awarded part of the first enterprise.[77]

Privatization business plans can be simplified by statutory resolution of certain major – yet highly uncertain – potential rights and duties. Each enterprise should be subjected by law to the "polluter pays" principle for future, and only future, liability. This clearly locates future environmental rights in the public, while maintaining societal responsibility for past environmental damage. All liabilities and credits with other state enterprises should be discharged by law upon privatization. This is reasonable since such inter-enterprise transfers have arisen almost solely from centralized planning distortions. The net result is a newly private enterprise able to write its future on a clean slate. Such an enterprise can present a valuable investment

[77]The ambiguity of enterprise boundaries is a potentially serious complication. "[T]here is an astonishing lack of information dispersed at the enterprise level about the connections with suppliers or customers." See W. Hogan, supra note 47 at 4.

opportunity, and attract risk capital accordingly.

D. Is Universal Distribution Practical?

i. The Immediate Vesting of Future Interests as a Simple and Effective Expedient

Universal distribution can be simplified by allocating each citizen a single "Stock Market Unit" (SMU), consisting of the right to one share of each enterprise privatized within some initial period, such as by the end of 1995. This would preserve fungibility and promote liquidity of SMUs. To motivate enterprise leaderships to privatize within that initial period, the statutory treasury stock compensation pool for the board and top management should be significantly reduced for any necessary follow-on interval. Such a follow-on interval, such as from the beginning of 1996 to the end of 2000, would have a corresponding tranche of "SMU2s". Therefore, part of the fluctuation in value of a SMU before its cut-off date would arise from changing expectations about the extent and timing of future privatization. SMUs would be a market index of expectations about future privatization prospects, and would help create a nationwide constituency for fast, massive and effective privatization.

This approach is more practical than either standard auctions or voucher schemes. A big problem with auctions is the absence of sufficient capital willing and able to bid realistically. Auctions can also be dominated by pools of capital raised by organized crime or through "spontaneous privatization", undermining the legitimacy of the transition to capitalism. In contrast, the SMUs represent a distribution of capital to the entire citizenry, not only obviating the problem of insufficient capital, but bolstering the legitimacy of transition as well.

Nor are the problems associated with auctions completely cured by voucher schemes. While vouchers can also be universally distributed either gratis or at nominal prices, they impose a major information burden. Many of the citizens missed in voucher schemes are precisely those in the most need, such as the illiterate or homeless.[78] Vouchers also require the bidder at auction to value individual enterprises without a time series of reliable accounting data and in the context of major social upheaval. This problem is magnified because the information burden comes with time deadlines. Vouchers are

[78]Note that even in Czechoslovakia, whose voucher campaign has been characterized as brilliant, 2.5 out of 11 million citizens did not participate. Foreign Broadcast Information Service (USR-92-103) 33 (Aug. 14, 1992).

wasting assets, becoming worthless after the corresponding auctions.

In contrast, SMUs provide a relatively stable investment imposing a minimum information burden without deadlines. They are more stable because they represent an entire portfolio, rather than a single enterprise. The information burden is reduced to the decision whether to keep, sell or buy more SMUs at the current market price. Since SMUs would be a major standardized asset, price discovery and dissemination should be more effective than for a myriad of individual enterprises. Each participant in the SMU market would then be a beneficiary of the price discovery achieved by the market's most sophisticated participants.

The absence of deadlines is fundamentally significant to the impact of SMUs. A legitimate and perhaps quite sophisticated strategy can be to simply hold them and collect the dividends. Since the original distribution is liable to resemble low-priced out of the money call options with extremely uncertain valuation and high implicit discount rates,[79] a "hold strategy" will allow recipients to reap the capital appreciation as the society stabilizes and implicit discount rates fall. The alternative is for that appreciation to accrue to so-

[79]See generally, R. Frydman, supra note 38 at 19, 27.

phisticated risk capital, with adverse distributional effects. To constrain the rate at which people make investment mistakes, vesting intervals such as 20% a year for five years could be imposed on alienability. This could correspond to the expected learning curve in the society, while stabilizing the market by avoiding sudden oversupply. However, to accelerate portfolio adjustments, stock ownership concentration, and a reversal of the communist legacy of "learned helplessness",[80] immediate vesting may well be preferable.

The distribution of SMUs can take the form of either script or of a bookkeeping entry of the entitlement in a computer system. A particular subclass of citizen such as adults could be provided the option to claim a certain percentage of the entitlement in the form of script. This script would be stamped each year upon claiming the accrued aggregated dividends of the underlying portfolio of enterprise shares. Since this script would represent a store of value and might well become to a degree a medium of exchange, it could be viewed as a quasi-currency. While it would fluctuate with the stock market value, it might represent an inflation hedge against debasement of the official

[80] A. Smolar, "Democratization in Central-Eastern Europe and International Security", in "New Dimensions in International Security - Part II", 266 IISS Adelphi Papers 25, 30 (1992).

currency, enhancing the ability of the government to control inflation.[81] It would also facilitate price discovery for SMUs, as large numbers of individuals engaged in daily transactions at fluctuating market prices.

However, the major form of distribution of SMUs can be as an entry in a computer system. Such a system can present to the entire citizenry a much wider range of investment opportunities. Such breadth of individual choice is valuable.[82] Citizens should be free to bid portions of their SMUs along with cash and mortgages at privatization auctions of small state enterprises such as shops.[83] Each individual should have the opportunity to exchange SMUs for selected foreign currencies,[84] government debt, shares or debt of a specific enterprise and annuities. The government can use the residual minority interest in enterprises kept in its social welfare account as a capital

[81]For a discussion on previous "bi-currency" regimes in Russia, including their ability to reduce the "emission tax" accruing to the government when it hyperinflates the money supply, see A. Arnold, "The Bipaper Standard and Hyper-Inflation", Banks, Credit and Money in Soviet Russia, 175, 196 (199x).

[82]World Bank, "The Economy of the USSR: Summary and Recommendations" p. 22 (1990).

[83]For a recent discussion of the status of the privatisation of retail shops in Russia, see L. Uchitelle, "Attention Moscow Shoppers: Everything's On Sale", New York Times 3 (July 26, 1992).

[84]See generally, T. Lane, "Inflation Stabilization and Economic Transformation in Poland: The First Year", IMF Working Paper p. 15 (July 1991); J. Kornai, "The Post-socialist Transition and the State: Reflections in the Light of the Hungarian Fiscal Problems", American Economic Association Meeting (New Orleans) Discussion Paper #1583 p. 26 (Jan. 1992).

base to insulate its budget from the actuarial uncertainties of such annuities, and to underwrite insurance for private financial institutions selling such annuities as principals.

As part of the social safety net, part of each individual's entitlement to ownership in large state enterprises could be placed into a restricted "social security" account. The only allowed investments in this account could be SMUs, government debt or lifetime annuities. As citizens, children should be entitled to a share, perhaps calculated as the percentage of an adult share corresponding to relative average budgetary needs and therefore a function of age interval.[85] A child's share should remain inalienable until his or her majority, except for health or education needs.[86] A corresponding allotment for children born in the future should not be funded by enforced new share creation, which could debase the market. However, it would be possible to fund such allocations for future births by means of a wealth or income tax.

[85]Boris Yeltsin has pledged that children shall have "first call" in Russia during the transition to a market economy. G. Gleason (rapporteur), "Immediate and Growing Needs for Help to a Fragile New Democracy: Health in the Russian Federation with Emphasis on Children and Women" 1, UNICEF/WHO (17 Mar. 1992).

[86]In all cases, alienability could be required for heritability, so a child's share would not be inheritable, and perhaps upon death should pass by law into the national government's social welfare account. On the other hand, upon reaching majority it would serve as a sort of patrimony.

To help fund welfare programs for the homeless, indigent or incapacitated, the local or regional governments can be allotted SMUs corresponding to an estimate of the number of citizens who are missed in the registration. Any citizen registering after a certain grace period such as a year would obtain his or her entitlement out of the account of the local or regional government, motivating it to register everyone fast to maximize both regional welfare and its own funding base. Combining registration for entitlement to stock rights with voter registration could even provide positive economic reinforcement to the democratic process.

ii. Logistics

Appropriate initial logistical constraints can ensure practicality. Transactions by individuals executed by the government are entered over the period of an investment cycle, which could initially be as long as a year. Transactions can be mailed or submitted in person, to either a local or central registry. As financial institutions and the societal infrastructure develop, telephone orders could be placed to brokerage houses which would guarantee authenticity, and relay the transactions to the central registry. Transactions are progressively combined and sorted by a hierarchy of computer centers,

resulting in a comprehensive transaction data base. At this point, the central computer facility processes the transactions, calculates market-clearing prices, and updates portfolios with current asset accounts. Even half a terabyte of storage, enough for a per capita storage allocation of five kilobytes in a population of one hundred million people, would cost under one hundred thousand dollars.[87]

[87]A. Raedeke, "Technology Update: 8mm Helical-Scan Tape", CD-ROM Professional 81, 83 (Mar. 1992).

## Chapter 6. Policy Proposal: Immediate Universal Vesting of the Future Interest in Privatized Large State Enterprises

### A. Steps to Take

#### i. Plan the Privatization

The first step is to formulate a privatization strategy. This need not be a master plan attempting to inappropriately specify choices in advance of future uncertain events.[88] Rather, it should establish the direction of the privatization policy and fix property rights, while preserving the flexibility to deal with future uncertainty.

The first element of privatization strategy is the choice of distribution technique, whether auction, voucher or universal vesting. Immediate universal vesting of the future interest in privatized large state enterprises (i.e., SMUs) is the policy of choice. Universal distribution is equitable, fast and effective, and its achievement by automatic vesting is more practical and equitable than voucher schemes. The universal vesting must be apportioned between rights to script and computer accounts. At least some portion of the SMUs

[88]See R. de Neufville, supra note 138 at 320

could be available in script form, to solidify public support, facilitate price discovery and inhibit inflation. Once a distribution technique is determined, recipients must be identified. Potential recipients include citizens, workers, management, banks, pension funds, charitable institutions, local or regional governments, in addition to a portion being retained by the national government. One effective policy would reserve a minority interest to the appropriate levels of government in social welfare accounts, and distribute the rest to the entire citizenry. This series of choices is important to make early, since the establishment of property rights is a precondition to an effective market economy.

After property rights are established, another series of policy choices must be made. If a computer system is implemented to support universal vesting of SMUs in all citizens, then the eligible investment opportunities must be specified. Alternatives include government debt, other debt including annuities, enterprise shares and foreign currency. Then the types of transactions on the assets which the system will support must be specified. In particular, the structure of any method of delegating investment authority must be addressed.

Finally, timing must be addressed. Some timing issues must be determined at the outset, such as the cut-off privatization date for enterprises to be included in SMUs. Others should also be resolved right away, such as the period after which new registrants such as the incapacitated or homeless would be allocated their portion out of a local or regional governmental account. But some timing issues can be resolved later, such as the safe harbor time interval for achievement of demonopolization goals without subjecting previous management or worker compensation stock to partial confiscation.

ii. Promulgate Legislation or Decree

Upon formulation of a privatization policy, the appropriate parts must be promulgated into law by legislation, decree or agency regulations. For example, a legislature could establish that each citizen is entitled to one Stock Market Unit (SMU) representing one share in each large state enterprise privatized before the end of 1995, an additional 1/4 SMU to be held in a restricted "social security" account, 1/10 SMU to be available to adult citizens as script in denominations of 1/100 and 1/1000 SMU upon registration (but with the option to leave it on account), and one SMU2 corresponding to subsequent privatizations up to the end of the year 2000. As another ex-

ample, legislation or decree could promulgate an emergency incomes policy whereby each CEO of a newly privatized large state enterprise would be paid the equivalent of three national average wages plus enterprise treasury stock equal to .01% of shares outstanding.

iii. Implement the System

Once the initial planning is completed and legislation has been enacted to define the fundamental outlines of a privatization strategy, the system must be implemented. As the policy apparatus of a country analyzes the changing situation and the policies of the national government evolve, additional legislation and decrees will be needed. To facilitate government management of a complex and challenging process, authority can be delegated to an agency such as a Privatization Board to review privatization business plans, promulgate regulations and oversee demonopolization.

Besides the legal and regulatory structure, it is necessary to actually establish the systems to carry out the privatization strategy. These include personnel systems to input and validate transactions, security systems to prevent embezzlement or privacy violations, and computer systems to process the

transactions. Lessons learned from the cycle of operation, maintenance and adaptation will then feed back into regulation and legislation.

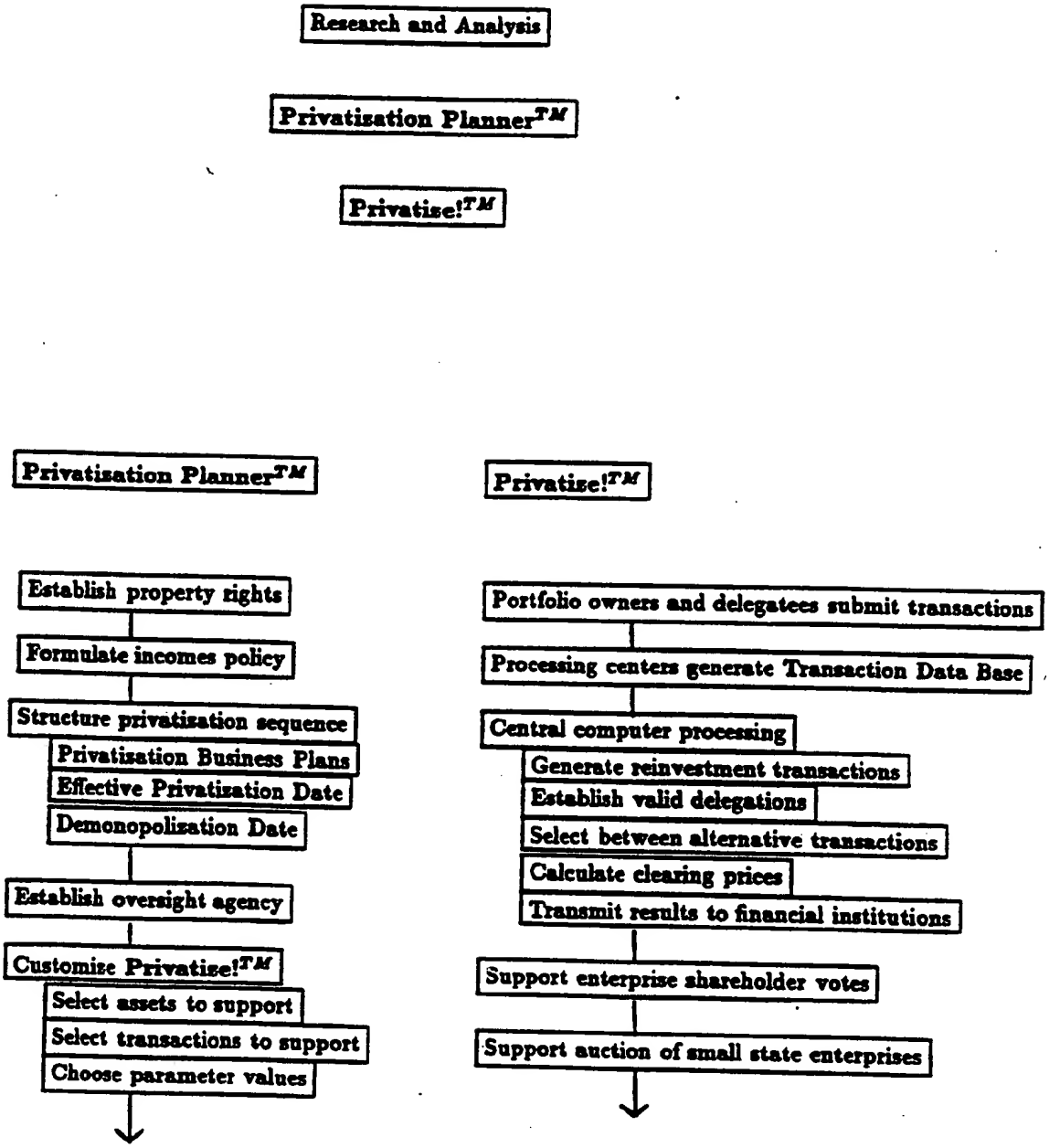
One way to structure an implementation strategy is by means of Privatization Planner$^{TM}$ and Privatize!$^{TM}$. (See Figure 2: Overview of Proposed Policy.) Privatization Planner$^{TM}$ provides a systematic overview of key policy choices in the privatization process. Privatize!$^{TM}$ sets out the design of a computer system to advance privatization and free markets. In combination, they support the development and the implementation of a privatization policy such as universal vesting of SMUs.

B. The Role of Selected Groups

i. Government Policy Makers

Different groups will have different roles in the proposed system. The government is responsible for formulating privatization policies and overseeing their implementation. This initially involves legislation or decrees which resolve property rights, establish a management incomes policy as appropriate, and delegate authority to an agency to oversee the privatization process. Subsequently, that agency must promulgate regulations to provide guidance to

Figure 2: Overview of Proposed Policy



and constraints upon the process. For example, professional organizations which accept investment authority over part of a portfolio in return for a share in the profits or assets could have a limit on the rates they charge. The agency itself must in turn be overseen by the legislature, executive and/or courts, who are in turn responsible to the citizenry in whom the entitlement to SMUs was created.

ii. Enterprise Management

Enterprise management must first develop a privatization business plan. This will often involve a search for identity, as leadership concentrations in an interwoven industrial infrastructure determine where their organization ends and their suppliers and customers begin. A key step in this phase is the emergence of a CEO, board of directors and top management, along with their stock compensation agreements. This process should involve interaction with the Privatization Board, so that the resulting privatization business plan is likely to be the product of negotiated decisionmaking, rather than the start of regulatory confrontation. In the case of heavily concentrated industries, executive vice-presidents should be placed in positions to coalesce any spin-offs needed to achieve demonopolization goals required by the Privatization

Board.

The Privatization Board may be authorized or directed to consider wage compacts as part of the Privatization Business Plan, in order to cushion the shock of transition on workers. This is inadvisable if workers have already received SMU entitlements including "social security" accounts, since it would constrain management from maximizing the value of the enterprise to its shareholders – the entire citizenry. However, management and workers should both seriously consider including stock compensation as part of wage negotiations.

Upon privatization, enterprise management can begin to accrue compensation stock. Vesting of such stock should be deferred until the Privatization Board has certified demonopolization. If demonopolization occurs after a safe harbor time interval, the Privatization Board should confiscate the part of management and worker compensation stock which it estimates to be attributable to monopoly rent arising subsequent to privatization. Spin-offs which survive an initial interval should liquidate a number of treasury shares determined by Privatization Board regulations and pay the proceeds to its parent organization's management as constituted at the date of spin-off.

Enterprise managements can also ensure that their organizations serve as data entry foci into the computer system. Enterprises would generate transaction data for their own portfolio, and records of employees along with negotiated stock compensation amounts. In addition, enterprises can serve as data entry centers for transactions by their employees, and perhaps on a compensated basis even for other members of their local community.

iii. Portfolio Owners

The proposed system places all citizens into the role of portfolio owners. As such, they are capable of evaluating alternative investments and entering transactions at local registries or enterprises.

While part of each owner's portfolio would remain on account with the government (for instance, at least the "social security" account), the remainder could be transferred to the individual's choice of financial institution for safekeeping and access.

iv. Processing Centers

From the perspective of processing centers, each is a node in a hierarchical

network of information flow. Each center receives transaction data from different sources, sorts and combines it, and passes it to the next higher node. The lowest nodes may receive virtually all transaction data from forms requiring data entry. Progressively higher nodes such as regional centers would typically handle as input the diskettes or tapes generated by the lowest nodes, and then send a single set of tapes on to the the next higher node. Eventually, a single composite data base is produced at a central processing facility. This data base is then processed to execute transactions as appropriate, and the results transmitted to custodial financial institutions.

## Chapter 7: Expected Effects of the Proposed Policy

### A. Things Going Wrong

#### i. Confusion

Confusion inevitably accompanies great social change. In particular, the transition from centrally planned economies to free markets involves the de-programming of decades of indoctrination. Basic concepts are alien. The "invisible hand" of Adam Smith seems a fairy tale. Profits all seem illicit. Private property seems anti-social. Initiative seems dangerous, while the danger of joblessness and poverty is frightening. The result can be bewilderment, and inconsistent or even directionless policy.

The implementation of the proposal for universal vesting of the future interest in privatized large state enterprises will be associated with more confusion. The concept of vesting an intangible future interest may seem novel. The different participants in the system – government policy makers, enterprise management, portfolio owners and processing centers – may not at first fully understand their respective duties and options.

The antidotes to confusion are clear policy directives, education and training, and patience. Each of these antidotes can be available. The universal vesting of the future interest in privatized large state enterprises may be novel, but it can be sold with clarity to a public in search of a system with legitimacy and better living standards. Education and training have international and domestic aspects. Exchange programs where citizens of newly democratic nations travel abroad to learn while members of successful democracies take their place to teach are already growing in scope. On the domestic side, while there is typically a dearth of teachers qualified to teach advanced courses in western business practices, the educational infrastructure is in many cases a strong asset capable of redirection. Finally, a certain interval of time is needed to successfully navigate such an expanse of social change, so patience is essential.

ii. Delays

The proposed policy involves the development of personnel systems, security systems and computer systems. All can be associated with notorious delays. Delays erode credibility, and credibility is the coin of government.

Two factors mitigate this problem. First, actual property rights can be created immediately upon the promulgation of universal vesting. These property rights are real, and could immediately be used to bid at auctions of small state enterprises. Script for a small portion of the new property rights could be issued right away to tangibly demonstrate the transfer of wealth from the government as custodian to the individual citizens as owners. If there is a delay in operationalizing the personnel, security and computer systems, the new asset will not be impaired – alternative investment choices will only be deferred. If the initial delay coincides with a process of stabilization, then exorbitant discount rates could be punctured and share values could increase, to the benefit of the citizenry. At any rate, the challenge in such an endeavour and its potential advantages would be no secret, and given the opportunity, a society collectively can have great sophistication in its evaluation of the performance of a government.

The other answer to delays is priority. One weakness of centrally planned economies has always been the inability to handle well the myriad simultaneous decisions facing a modern society. On the other hand, they often have demonstrated the capacity to do "any thing." That is, given enough

priority, a particular objective could be achieved in world-class fashion. If the transition to democracy goes hand in hand with free markets, and if free markets are contingent upon privatizing large state enterprises, it would seem appropriate for policy makers to allocate the human and material resources to achieve that goal as rapidly as possible.

iii. Transaction Processing Errors

It can be assumed that every possible error will happen. Fictitious citizens will be registered. Homeless, incapacitated and illiterate citizens will be missed. Actual portfolio owners will request transactions they don't mean. Data entry personnel will input transactions other than directed. Intermediate processing centers will lose segments of the transaction data base. The central computer facility will encounter software and hardware glitches, and oerator errors. Choice of delegatee-organizations, choice between alternative orders, and matching buy and sell orders will occur at approximate prices. Assets intended to be transmitted to custodial financial institutions will be delayed or lost. At each stage of the process, individuals outside government without authorized access and individuals within government with authorized access will attempt to use information improperly. While each of these

problems occurs in mature market economies as well, it can be expected that their magnitude will be greater in newly democratic nations.

Problems will occur with any privatization policy, and the proposed policy can effectively address problems which do arise. Standard audit practices can raise the cost of fictitious registration: requiring local authentication at initial registration, random checking of the legitimacy of registrants, analysis of data for suspicious patterns, penalties assessed against the social welfare allocation of local governments with poor records in allowing fictitious entries, and restitution of falsely claimed assets with additional penalties corresponding to the number of false registrations likely to be missed. Allocating late registrants (e.g., a homeless person registering after two years) their entitlement out of the local government's social welfare portfolio will encourage it to initially miss as few as possible.

To minimize portfolio owners entering transactions they don't mean, information can be distributed to clarify choices. Still, some mistakes are part of the tuition in traversing the learning curve. If data entry personnel enter erroneous records, they can be canceled. If segments of the transaction data base are missing, the regional centers can attempt to validate completeness

and request missing segments. When errors are caught, any consequential loss sustained by the portfolio owner can be made good out of the responsible government's account, which would likewise accrue any consequential gain.

At the central computer facility, processing disruptions may necessitate recovery procedures such as reprocessing from the latest backup. Software glitches may be identified and patched. The degree of price approximations will be a function of processing power available, more a function of western export licenses than technological constraints. Transmittals to custodial financial institutions will be backed up and available for retransmittal as necessary. Improper use of the information data bases can be dealt with by law, so that what could have been Orwellian technology can instead be harnessed in the interest of economic security and individual liberty.

B. Things Going Right

i. Immediate Resolution of Ownership Rights

A fundamental advantage of the policy to universally vest future privatization interests is the immediate resolution of ownership rights. While the wealth transfer is intangible until distributed as script, used in a bid at auction, or

accessible with a computer system, it is real nonetheless. It can boost current household wealth and future household income, providing a non-inflationary stimulus to the economy.

The proposed policy is superior to alternatives which include as recipients entities other than governments or citizens (e.g., enterprise employees). The reason is that to a first order approximation, with universal vesting the establishment of inter-enterprise boundaries does not affect wealth distribution. Indeed, it becomes in the interest of the citizenry and the hierarchy of governments to approve enterprise boundaries which maximize their aggregate rather than individual worth.

ii. Individual Social Security: "Safety Net"

Universal vesting also provides an important safety net to individual citizens. The "social security" segment of an individual's portfolio can be restricted to portfolio stock, government debt or lifetime annuities. This social security account is a meaningful asset which can be disbursed for medical or living necessities. The allocations to children can provide needed support, finance education and help prevent intergenerational poverty cycles. In the process

of providing an individual safety net, the social security account will also reduce the social welfare burden on future government budgets.

iii. Individual Economic Opportunity: "Trampoline"

The unrestricted portion of a citizen's portfolio is a valuable patrimony. It can be used to bid at auctions of small state enterprises, start a business, relocate a family, buy land or make alternative investments. While some individuals may be shrewder or luckier, all can receive the same economic opportunity. The result can unleash the economic power of decentralized decisions conforming to each individual's personal utility.

iv. Promotion of a Free Market

Universal vesting of future privatization rights can promote free markets. It can be instrumental in the rapid and effective privatization of large state enterprises, which is essential for valid price signals. It can create opportunities for alternative investments such as foreign currencies. It can also promote capital formation by accelerating the creation of markets in individual enterprises, accessible to citizens and foreign investors alike.

v. Transition to Private Financial Institutions

The proposed system incorporates the concept of promoting the transition to private financial institutions. Individuals can transfer assets (except perhaps from the "social security" account) into approved custodial financial institutions of their choice, gaining more privacy, faster access and the ability to change investment strategies more rapidly. This can also provide a source of capital to new financial institutions, which can then serve as capital intermediaries to enterprises in growth industries.

Appendix 2: Sample Screens

The following screens are samples illustrating typical screen layouts and page contents.

In order to double up screen output onto a laser printer, two additional commands have been implemented:

L draws a solid line across the middle of the page after the first screen has been printed;

F issues a form feed to eject the page after the second screen has been printed beneath the first.

```
rivatization Planner(tm)
                        Privatization Planner(tm)
-------You are wjh, looking at the default version, with default values--------
his software package is designed to support the systematic
ormulation of privatization policy.  An initial data base of
nformation will provide a basic tutorial on the issues and
ptions in privatizing large state enterprises.

ach "generation" a primary version and selected alternates
ill be distributed.  Users can then evaluate and comment on
he various screens and pages, and submit proposals for added,
eplaced or deleted screens and pages.

ased on the aggregated evaluations, inferior alternatives
ill be pruned before the next generation.  Authors of retained
nformation can be given the opportunity to edit their material
ased on the evaluations and comments received.


nter command:

Page    Add   Replace   Delete   Values  Eval  Screen  User   Help   Quit
0- 2    1- 2   1- 2      1- 2                   mode   [id]
```

---

```
rivatization Planner(tm)                          Fri Oct 16 00:47:12 1992
                        Privatization Planner(tm)
--------You are wjh, looking at the default version, with default values--------
 Next Higher Screen  (S0 for Root)

:1 Introduction
:2 Methods of Share Distribution
:3 Timing Considerations
:4 Privatize!(tm) Customization
5 Administrative Information


nter command:

creen   Add   Replace   Delete   Title   Eval   Page   User   Help   Quit
0- 5    1- 5   1- 5      1- 5                   mode   [id]
```

```
Privatization Planner(tm)
                        Privatize!(tm) Customization
--------You are wjh, looking at the default version, with default values--------
 Next Higher Screen  (S0 for Root)

S1 Files
S2 Modules
S3 Transactions
S4 Assets
S5 Financing the system


Enter command:

Screen   Add    Replace    Delete    Title    Eval    Page    User    Help    Quit
 0- 5    1- 5   1- 5       1- 5                       mode    [id]
```

---

```
Privatization Planner(tm)                          Fri Oct 16 00:48:39 1992
                        Financing the system
--------You are wjh, looking at the default version, with default values--------
S Next Higher Screen  (S0 for Root)

S1 General budgetary resources
S2 Enhanced tax collection over portfolio earnings
S3 Tax on portfolio assets
S4 Fee based on size of transaction block
S5 Fee based on number of transactions
S6 Fee to support enterprise votes
S7 Fee to register enterprise debt instruments
S8 Implicit Arbitrage Revenue


Enter command:

Screen   Add    Replace    Delete    Title    Eval    Page    User    Help    Quit
 0- 8    1- 8   1- 8       1- 8                       mode    [id]
```

```
rivatization Planner(tm)
                                   Files
-------You are wjh, looking at the default version, with default values--------
 Next Higher Screen  (S0 for Root)

1 Disposition File  (DF)
2 Disposition File - Excerpts (DFXXXX)
3 Delegation Offer File (DOFF)
4 Delegatee Order File (DORF)
5 Enterprise File (EPRISE)
6 Order File (ORDERS)
7 Asset Price File (PRICES)
8 Transaction Data Base (XDB)



nter command:

creen    Add    Replace    Delete    Title    Eval    Page    User    Help    Quit
0- 8     1- 8   1- 8       1- 8                       mode    [id]
```

---

```
rivatization Planner(tm)                          Fri Oct 16 00:51:05 1992
                                   Modules
-------You are wjh, looking at the default version, with default values--------
 Next Higher Screen  (S0 for Root)

:1 ACTUARY (calculates periodic annuity payments)
:2 AUCTION (supports bidding with SMUs at small enterprise auctions)
:3 DELCOMP (calculates threshold delegatee compensation)
:4 DISPOSE (prepares transmittals to custodial financial institutions)
:5 DORFGEN (generates Delegatee Order File - DORF)
:6 EGEN (generates Enterprise File - EPRISE)
:7 EVOTE (supports polled shareholder voting)
:8 PASS1 (transaction processing: first pass)
 9 PASS2 (transaction processing: second pass)
:10 PASS3 (transaction processing: third pass)
 11 PASS4 (transaction processing: fourth pass)
 12 PASS5 (transaction processing: fifth pass)
 13 PRICING (determines market-clearing prices)
 14 XACT (generates the Transaction Data Base - XDB)
:15 XBLOCK (analyses a transaction block)
:nter command:

creen    Add    Replace    Delete    Title    Eval    Page    User    Help    Quit
0-15     1-15   1-15       1-15                       mode    [id]
```

```
rivatization Planner(tm)
                                Transactions
------You are wjh, looking at the default version, with default values--------
 Next Higher Screen  (S0 for Root)
 1 ACQUIRE (attempt to obtain an asset in exchange for another)
 2 BANK (financial institution to process debt payments of an enterprise)
 3 CANCEL (cancel previous, unexecuted transactions)
 4 DELEGATE (delegate investment or voting authority over specified assets)
 5 DIVIDEND (total dividends paid by an enterprise to shares on the system)
 6 ELSE (alternative ACQUIRE transaction if first price contingencies not met)
 7 FILTER (delegatee orders to apply to selected portfolios or assets)
 8 GRADE (evaluation of financial institution)
 9 IDENT (identification of portfolio owner)
 10 JOIN (enterprise employee stock compensation and date of hire)
 11 LEAVE (date enterprise employee ceases employment)
 12 OVERSIGHT (dates of privatization and demonopolization; confiscation %)
 13 PERCENTAGE (minimum compensation acceptable to delegatee organization)
 14 REINVEST (specifies how portfolio earnings are to be invested)
 15 SECURITY (apply transactions to "social security" portion of portfolio)
 16 TRANSFER (transfer specified assets to particular financial institution)
nter command:

creen   Add    Replace   Delete    Title   Eval   Page   User   Help   Quit
 0-16   1-16    1-16      1-16                    mode   [id]
```

---

```
rivatization Planner(tm)                          Fri Oct 16 00:52:25 1992
                                Assets
--------You are wjh, looking at the default version, with default values--------
 Next Higher Screen  (S0 for Root)

 1 ALL (composite of all assets in portfolio)
 2 DXXXX (debt of specific borrower, as an asset in lender's portfolio)
 3 DIXXXX (debt indexed for inflation)
 4 EXXXX (stock in specific enterprise)
 5 FCXX (foreign currency)
 6 PAYOUT (generalized annuity)
 7 SMU (Stock Market Unit, basket of shares privatized by 199x)
 8 SMU2 (2d trance of SMUs, basket of shares privatized between 199x and 200y)
 9 VOUCHER (privatization voucher)
 10 Virtual Asset - DR (donation "right" transferred to donor for gift)
 11 Virtual Asset - LSER (large state enterprise rights exchanged for SMUs)
 12 Virtual Asset - SSER (small state enterprise rights)
 13 Virtual Asset - TR (testamentary rights)
 14 Virtual Asset - VAL (value received external to the software system)

nter command:

creen   Add    Replace   Delete    Title   Eval   Page   User   Help   Quit
 0-14   1-14    1-14      1-14                    mode   [id]
```

Appendix 3: Program Listing

**The following listing sets out the source code for Privatization Planner™, which has been implemented up to the stage where the system coordinator evaluates and selects information for redistribution.**

```
/*  Privatization Planner(tm)  Version 0.7  */

/*  Processing directives, function declarations,
    global variable declarations   */

/*  October 15, 1992 (copyright 1992 by William J. Hartnett) */

#include <stdlib.h>
#include <dir.h>
#include <stdio.h>
#include <string.h>
#include <conio.h>
#include <dos.h>
#include <io.h>
#include <fcntl.h>
#include <sys\stat.h>
#include <time.h>
#include <process.h>
#include <fcntl.h>

/* largest # of inserted files per user per level  */
#define MAXIFILE 100
#define USERSLN 2000
#define UDELIM "*"
#define VMAX 30
#define PAGELEN 1600
#define MAXSP 300
```

```
#include<\tc\tpp\includs.c>

void adopt(int k);
void login(), paintp(), paints(), rtrn();
void screen(), survey(), updtf(), varval(int i, char val[80]);
int addrep(char fnm[MAXPATH], int place);
void xcerpt(int iswitch);
int idcheck();
char* fn(char filename[9]);
char* fn2(char filename[9]);
void ucmnd(char whence[7]), vcmnd();

FILE *maps, *mapp, *react, *title;

struct ffblk ffblk;

int output, updts, updtp, updtr, status;
int wt1,wt2,wt3,wt4; /* title window corners */
int wx1,wx2,wx3,wx4; /* screen/page window corners */
int wi1,wi2,wi3,wi4; /* interaction window corners */
int wf1,wf2,wf3,wf4; /* footer window corners */
int uhandle;
int ips, ps, nsptot[2], nspid[2];
int spfirst[2], splast[2], spfcode[2];
int newpage, usepage;
int xval[30],yval[30],lval[30],nval;

char sparray[7800], response[240], pagedata[PAGELEN];
char sp[2][MAXSP][13], sptext[2][10], spchar[2][2];
char t[80], tnok[80], r[2000], idch[13];
char drive[MAXDRIVE], pfile[MAXPATH];
char path[MAXDIR], cwd[MAXDIR];
char fname[MAXPATH];
char dum[160];
char userid[6],varid[6],usersinfo[USERSLN];
char *ptr,whence[7];
char timbuf[27];
```

```
#include <\tc\tpp\global.c>

 /*  Program Main  -- The root module.   */

main()
{

char reaction[1000], cfirst;
char fnm[MAXPATH], curdir[MAXPATH], orgdir[MAXPATH];
char newidch[5];
char *cwdext;

int handle, idexist, dummy, newdir, place;
int i, j;

wt1=1; wt2=3; wt3=80; wt4=1; /* title window */
wx1=1; wx2=5; wx3=80; wx4=21; /* screen/page window */
wi1=1; wi2=22; wi3=80; wi4=23; /* interaction window */
wf1=1; wf2=24; wf3=80; wf4=25; /* footer window */

getcwd(orgdir,MAXPATH);

strcpy(tnok,"title missing");
printf("tnok: %s\n",tnok);
strcpy(sptext[0],"screen");
strcpy(sptext[1],"page");
strcpy(idch,"");
strcpy(varid,"");
strcpy(sparray,NULL);
strcpy(&spchar[0][0],"S"); strcpy(&spchar[1][0],"P");
spfcode[0]=FA_DIREC; spfcode[1]=0;

clrscr();

printf("Privatization Planner (tm) Version 0.7  \n\n");
printf(''Copyright 1992 by William J. Hartnett \n'');
printf("enter debugging level [0=none, 9=lots]: ");
scanf("%id",&output);
printf("\nEnter disk drive for plan file [e.g., 'a:']: ");
scanf("%s",drive);
if(output >= 9) printf("drive= %s\n",drive);
printf("\nEnter directory of plan file [e.g., 'planner']: ");
scanf("%s",pfile);
pfile[8]='\0';  /* truncate name at 8 bytes, if longer */
```

```
if(output >= 5) printf("drive= %s, file=%s\n",drive,pfile);
strcpy(path,drive);
strncat(path,"\\",2);
strncat(path,pfile,9);
if(output >= 3) printf("path= %s\n",path);
mkdir(path);
chdir(path);

login();

newpage=1; usepage=1;

strcpy(r,"\0");
strcat(r,UDELIM);
strcat(r,userid);
strcat(r,"\n");

survey();
ps=1;

start: if(ps==1) paintp();
else paints();

/* input command and process */
prompt: window(wi1,wi2,wi3,wi4); clrscr();
printf("Enter command: ");
cmnd: scanf("%s",response);
cfirst=toupper(response[0]);
gotoxy(1,2);
if(output >= 9)
printf("command string: %s,  cfirst: %ic\n",response,cfirst);

switch (cfirst) {

/* printer support functions  */
case 'L':       /* bisect page */
strcpy(response,"\n\n\n\n_____________________________________________________________
fwrite(response,1,88,stdprn);
break;

case 'F':       /* eject page  */
fwrite("",1,1,stdprn);
break;
```

```
/* ------------------------------------------------
   The S command supports changing to another screen
   (or switching into screen mode from page mode).
   ------------------------------------------------ */
  case 'S':


  if(ps==1)
{
updtf();
window(1,1,80,25);
clrscr();
ps=0;
goto start;
}


  if(ps==0)
  {
  newdir=atoi(&response[1]);
  if((newdir<0)||(newdir>nspid[ps]))
{
gotoxy(1,1);
printf("Must be in form S (to go up) or S%d to S%d.\nTry again: ",0,nspid[ps]);
goto cmnd;
}

  updtf();

if(newdir>0)
{
strcpy(fnm,drive);
strcat(fnm,&sp[ps][spfirst[ps]+newdir-1][0]);
}

else
    {
    if (strncmp(&response[1],"0",1) == 0)
    {strcpy(fnm,path); goto doit;}
    else


{
getcwd(curdir,MAXPATH);
```

```
if(strcmpi(path,curdir) == 0)
{
gotoxy(1,1); clrscr();
printf("No higher directory available.\n");
printf("Try a different command: ");
goto cmnd;
}

else
strcpy(fnm,"..");     /* s0 --> next higher directory */
}
   }
doit:   chdir(fnm);
  survey();
  goto start;
  }

  printf("Big trouble: ps isn't 0 or 1!");
  exit(status);
```

```
  /* ---------------------------------- */
  case 'A':
  if(idcheck() < 0) goto cmnd;  /* change disallowed */
  place=atoi(&response[1]);  /* where to place */
  if(place == 0) place = nspid[ps]+1;
  if((place < 1) || (place > nspid[ps]+1))
   {printf("Must be in form A (append new screen), or A%d to A%d.\n",
   1,nspid[ps]+1);
   printf("Try again: ");
   goto cmnd;}

  if(addrep(fnm,place) < 0) goto cmnd;

  if(nsptot[ps] >= MAXSP)
{
printf("Total number of screens equals %d -- all full!"
"  Try something else: ",nsptot[ps]);
goto cmnd;
}

  xcerpt(1);
  if(splast[ps] < spfirst[ps]) /* first sequence for this id */
{
if(place != 1)
{
printf("New sequence, but place != 1???");
rtrn();
}
strcpy(&sp[ps][nsptot[ps]][0],"U");
strcat(&sp[ps][nsptot[ps]][0],idch);
strcpy(&sp[ps][nsptot[ps]+1][0],fnm);
nsptot[ps]=nsptot[ps]+2;
}

  else /* update sequence for this id*/
{
for(i=nsptot[ps]; i>=spfirst[ps]+place-1; i--)
strcpy(&sp[ps][i+1][0],&sp[ps][i][0]);
strcpy(&sp[ps][spfirst[ps]+place-1][0],fnm);
nsptot[ps]=nsptot[ps]+1;
}
  break;
```

```
  /* ---------------------------------------- */
  case 'R':
  if(idcheck() < 0) goto cmnd;  /* change disallowed  */
  place=atoi(&response[1]);
  if((place < 1) || (place > nspid[ps]))
  {gotoxy(1,1);
  if(nspid[ps] >= 1)
  printf("Must be in form R%d to R%d. Try again: ",1,nspid[ps]);
  else
  printf("No %ss to replace. Try again:",sptext[ps]);
  goto cmnd;}

  if(addrep(fnm,place) < 0) goto cmnd;

  xcerpt(1);
  if(splast[ps] < spfirst[ps])
{
printf("Logic error in 'R' command.");
exit(status);
}
  strcpy(&sp[ps][spfirst[ps]+place-1][0],fnm);
  break;
```

```
  /* ---------------------------------------- */
  case 'D':
  if(idcheck() < 0) goto cmnd;   /*  change disallowed  */
  place=atoi(&response[1]);
  if((place < 1) || (place > nspid[ps]))
  {gotoxy(1,1);
  if(nspid[ps] >= 1)
  printf("Must be in form D%d to D%d.  Try again: ",1,nspid[ps]);
  else
  printf("No %ss to delete.  Try again:",sptext[ps]);
  goto cmnd;}

  xcerpt(1);
  if(splast[ps] < spfirst[ps])
{
printf("Logic error in 'D' command.");
exit(status);
}

  for(i = spfirst[ps]+place-1; i <= nsptot[ps]-1; i++)
  strcpy(&sp[ps][i][0],&sp[ps][i+1][0]);
  nsptot[ps]=nsptot[ps]-1;

  if(ps==0) updts=1;
  else updtp=1;
  break;
```

```
  /* ---------------------------------------- */
  case 'T':
  if(ps==1) goto nogood;  /* only works with screen mode  */

  getcwd(cwd,MAXDIR);
  cwdext=strrchr(cwd,atoi('.'))+1;  /* e.g., (.)abc  */
  if(strlen(cwdext) > 3) strcpy(cwdext,"");
  if(strcmpi(userid,cwdext) != 0)
{
gotoxy(1,1); clrscr();
printf("Can't change title of adopted screen!  Try something else: ");
goto cmnd;
}

  if(idcheck() < 0) goto cmnd;
  gotoxy(1,1); clrscr();
  printf("Enter new title for this screen:\n");
  rewind(stdin);
  scanf("%[^\n]",t);
  strcpy(fnm,drive);
  strcat(fnm,"title");
  strcat(fnm,".");
  strcat(fnm,idch);
  handle=open(fnm,O_RDWR|O_CREAT,S_IREAD|S_IWRITE);
  if((output>=5)&&(handle<0))
{
perror("plan.c");
rtrn();
}
  write(handle,t,strlen(t)+1);
  close(handle);
  if(output >= 9)
  {
  gotoxy(1,1);
  printf("screen fnm: %s,  handle= %5d\n",fnm,handle);
  }

  break;
```

```
  /* ---------------------------------------- */
  case 'E':
  if(strcmpi(idch,userid) == 0)
  {printf("Cannot evaluate own setup!  Try a different command: ");
   goto cmnd;}

  getcwd(path,MAXPATH);
  fnsplit(path,dum,dum,fnm,dum);

  printf("Please evaluate this %s (1=very poor, 5=very good): ",
  &sptext[ps][0]);
  rewind(stdin);
  scanf("%s",dum);

  if(strlen(dum) >= 1)
{
if (ps == 0) strcat(r,"."); /* "." denotes current screen */
else strcat(r,&sp[ps][usepage][0]);
strcat(r," E ");
strcat(r,dum);
strcat(r,"\n");
updtr=1;
}
  clrscr();
  printf("Please enter any comment on this %s:\n",&sptext[ps][0]);
  rewind(stdin);
  scanf("%[^\n]",dum);
  if(strlen(dum) >= 1)
{
if(ps == 0) strcat(r,".");
else strcat(r,&sp[ps][usepage][0]);
strcat(r," C ");
strcat(r,dum);
strcat(r,"\n");
updtr=1;
}

  break;
```

```
  /* ---------------------------------------- */
  case 'P':
  if(ps==0)
{
updtf();
window(1,1,80,25);
clrscr();
ps=1;
goto start;
}

  if(ps==1)
{
newpage=atoi(&response[1]);
if(newpage == 0) newpage = usepage + 1;
if((newpage<0) || (newpage>nspid[ps]))
{
gotoxy(1,1);
printf("Must be in form P (increment unless last) or P%d to P%d. Try again: ",
0,nspid[ps]);
goto cmnd;
}
usepage=newpage;
goto start;
}

  printf("Big trouble: ps isn't 0 or 1!");
  exit(status);
```

```
  /* ---------------------------------------- */
  case 'U':
  ucmnd(whence);
  survey();
  if(strcmp(whence,"prompt")==0) goto prompt;
  if(strcmp(whence,"cmnd")==0) goto cmnd;
  if(strcmp(whence,"start")==0) goto start;
  printf("UCMND done.  What now?? Whence = %s",whence);
  exit(status);

  case 'V':
  if(ps == 0) goto nogood;
  vcmnd();
  goto start;


  case 'H':
  /* add on-line help */
  if (output >= 9) printf("switch case H");
  break;

  case 'Q':
  updtf();
  window(1,1,80,25);
  clrscr();
  chdir(orgdir);
  exit(status);

  default:
nogood:   gotoxy(1,1);
  printf("Invalid command. Please enter new command (H for help): ");
  goto cmnd;}

goto start;  /* cycle up for another command */


}
```

```
/*  Privatization Planner (tm)  Subroutines  */


#include<\tc\tpp\includs.c>

extern void adopt(int k);
extern void login(), paintp(), paints(), rtrn();
extern void screen(), survey(), updtf(), varval(int i, char val[80]);
extern int addrep(char fnm[MAXPATH], int place);
extern void xcerpt(int iswitch);
extern int idcheck();
extern char* fn(char filename[9]);
extern char* fn2(char filename[9]);
extern  void ucmnd(char whence[7]), vcmnd();

extern FILE *maps, *mapp, *react, *title;

extern struct ffblk ffblk;

extern int output, updts, updtp, updtr, status;
extern int wt1,wt2,wt3,wt4; /* title window corners */
extern int wx1,wx2,wx3,wx4; /* screen/page window corners */
extern int wi1,wi2,wi3,wi4; /* interaction window corners */
extern int wf1,wf2,wf3,wf4; /* footer window corners */
extern int uhandle;
extern int ips, ps, nsptot[2], nspid[2];
extern int spfirst[2], splast[2], spfcode[2];
extern int newpage, usepage;
extern  int xval[30], yval[30], lval[30], nval;

extern char sparray[7800], response[240], pagedata[PAGELEN];
extern char sp[2][MAXSP][13], sptext[2][10], spchar[2][2];
extern char t[80], tnok[80], r[2000], idch[13];
extern char drive[MAXDRIVE], pfile[MAXFILE];
extern char path[MAXDIR], cwd[MAXDIR];
extern char fname[MAXPATH];
extern char dum[160];
extern char userid[5],varid[5],usersinfo[USERSLN];
extern char *ptr, whence[7];
extern  char timbuf[27];
```

```
#include <\tc\tpp\extern.c>

/* Adopt implements a user's choice to adopt the organization
and/or page contents of another user  */
void adopt(int k)
{
int i;
/* Delete previous Uuserid segmend */
ips=k;
xcerpt(2);
if(splast[k] >= spfirst[k])
{
nsptot[k]=nsptot[k]-(splast[k]-spfirst[k]+2);
for(i=spfirst[k]-1; i<=nsptot[k]; i++)
strcpy(&sp[k][i][0],&sp[k][i+splast[k]-spfirst[k]+2][0]);
}

/* Append adopted (idch) version under userid rubric */
strcpy(&sp[k][nsptot[k]][0],"U");
strcat(&sp[k][nsptot[k]][0],userid);

ips=k;
xcerpt(1);
if(splast[k] < spfirst[k])
{
printf("Null set adopted.  What next? ");
return;
}

for(i=spfirst[k]; i<=splast[k]; i++)
strcpy(&sp[k][nsptot[k]+i-spfirst[k]+1][0],&sp[k][i][0]);

nsptot[k]=nsptot[k]+splast[k]-spfirst[k]+2;
if(k == 0) updts=1;
else updtp=1;
updtf();
}
```

```
/* Module addrep handles logic common to the
   add ('A') and replace ('R') commands        */

int addrep(char fnm[MAXPATH], int place)
{
int i, handle;
int numl, numr, pgdptr;
int left[VMAX], right[VMAX];

char convi[3];
char spname[13], placech[3], ich[3], response[80];

strcpy(spname,&spchar[ps][0]);
itoa(place,placech,10);
strcat(spname,placech);
strcpy(fnm,drive);
strcat(fnm,spname);
strcat(fnm,".");
strcat(fnm,idch);


/* need to generate alternative name? */
if(findfirst(fnm,&ffblk,spfcode[ps]) == 0)
{for(i=1; i<=MAXIFILE; i++)
{
strcpy(spname,&spchar[ps][0]);
strcat(spname,"i");
itoa(i,ich,10);
strcat(spname,ich);
strcpy(fnm,drive);
strcat(fnm,spname);
strcat(fnm,".");
strcat(fnm,idch);
if(findfirst(fnm,&ffblk,spfcode[ps]) != 0) goto avail;
}
gotoxy(1,1);
printf("User %s already has %d new %ss.\n",
idch,MAXIFILE,&sptext[ps]);
printf("Add and Replace unavailable.\n");
printf("Try a different command:");
return(-1);
}
avail: ;
```

```
if(ps==0)
{
mkdir(fnm);
/* printf("addrep1, fnm: %s",fnm);rtrn();  zap */
strcpy(fnm,drive);
strcat(fnm,spname);
strcat(fnm,".");
strcat(fnm,idch);
strcat(fnm,"\\");
strcat(fnm,"title");
strcat(fnm,".");
strcat(fnm,idch);
/* printf("addrep, fnm:  %s",fnm);    zap  */
handle=open(fnm,O_RDWR|O_CREAT,S_IREAD|S_IWRITE);
if((output >=5) && (handle < 0))
{perror("new screen title:");rtrn();}
gotoxy(1,1); clrscr();
printf("Enter title for your  new screen:\n");
rewind(stdin);
scanf("%[^\n]",response);
write(handle,response,strlen(response)+1);
close(handle);
}

else
{
window(1,1,80,1); gotoxy(32,1);
printf("%s %d of %d",sptext[ps],place,nspid[ps]+1);
strcpy(fnm,drive);
strcat(fnm,spname);
strcat(fnm,".");
strcat(fnm,idch);
handle=open(fnm,O_RDWR|O_CREAT,S_IREAD|S_IWRITE);
if((output >= 5) && (handle < 0))
{perror("New page:");rtrn();}
inp:    window(wi1,wi2,wi3,wi4); gotoxy(1,1);
printf("Enter contents of your new page (@ and carriage return to end):");
window(wx1,wx2,wx3,wx4);clrscr();
rewind(stdin);
scanf("%[^@]",pagedata);
rewind(stdin);
write(handle,pagedata,strlen(pagedata)+1);
```

```
close(handle);
usepage=place;

for (numl=0, numr=0, pgdptr=0; pgdptr<strlen(pagedata); pgdptr++)
{
if(pagedata[pgdptr] == '{')
{left[numl]=pgdptr; numl++;}
if(pagedata[pgdptr] == '}')
{right[numr]=pgdptr; numr++;}
}

if (numl != numr)
{printf("Mismatched number of '{' (%d) and '}' (%d)",
numl, numr);  goto inp;}

if (numl > VMAX)
{printf("Too many variables: %d > %d!", numl, VMAX);
goto inp;}

for (i=0; i<numl; i++)
{
strcat(r,spname);
if(strcmp(idch,"") != 0)
{strcat(r,"."); strcat(r,idch);}
strcat(r," V ");
strcpy(convi,itoa(i+1,convi,10));
strcat(r,convi);
strcat(r," ");
strncat(r,&pagedata[left[i]+1],right[i]-left[i]-1);
strcat(r,"\n");
}

if (numl > 0)
{updtr=1; updtf();}


window(wi1,wi2,wi3,wi4);
clrscr();
}


strcpy(fnm,spname);
if(strcmp(idch,"") != 0)
{
```

```
strcat(fnm,".");
strcat(fnm,idch);
}

if(ps==0) updts=1; else updtp=1;

return(1);
}
```

```
/* Module fn returns a file path, appending idch */

char* fn(char filename[9])
{
strcpy(fname,drive);
strcat(fname,filename);
strcat(fname,".");
strcat(fname,idch);
/* printf("\nfn. use: %s  (drive: %s  name: %s  idch: %s).\n",
fname,drive,filename,idch);     */
return(fname);
}

/* Module fn2 returns a file path, appending userid */

char* fn2(char filename[9])
{
strcpy(fname,drive);
strcat(fname,filename);
strcat(fname,".");
strcat(fname,userid);
/* printf("\nfn. use: %s  (drive: %s  name: %s  idch: %s).\n",
fname,drive,filename,idch);     */
return(fname);
}

/* Module idcheck returns 1 if user is in own setup, otherwise -1 */

int idcheck()
{
if(strcmpi(idch,userid) == 0) return(1);
else
    {
    gotoxy(1,1);
    clrscr();
    printf("Changing another user's setup is disallowed.  To adopt this user's setup,")
    printf("\ntype U%s from Screen mode.  New command: ",userid);
    return(-1);
    }
}
```

```
/* Module login identifies a new or previous user */

void login()
{
int i, nbytes, offset;
char *ptr1, ans[80];

uhandle=open("users",O_RDWR|O_CREAT,S_IREAD|S_IWRITE);
if(uhandle < 0)
{perror("users: ");
exit(status);}

printf("\nEnter user ID of up to three characters: ");
scanf("%s",userid);
if(strcmp(userid,"#1")==0) {strcpy(userid,"");return;}

nbytes = read(uhandle,usersinfo,USERSLN);
offset=0;

while(offset < nbytes)
{
ptr=&usersinfo[offset];
if((strncmp(ptr,UDELIM,1) == 0)
 &&(strcmp(ptr+1,userid) == 0))
{
offset=offset+strlen(ptr)+1;
if(strncmp(&usersinfo[offset],UDELIM,1) != 0)
printf("\nHello, %s\n",&usersinfo[offset]);
delay(750);
close(uhandle);
return;
}
 else
offset=offset+strlen(ptr)+1;
 }


/* Id not yet logged. Log it with other info  */
strcpy(ans,UDELIM);
strcat(ans,userid);
write(uhandle,ans,strlen(ans)+1);

printf("\n\nPlease enter your name:\n");
```

```
rewind(stdin);
scanf("%[^\n]",ans);
write(uhandle,ans,strlen(ans)+1);

printf("\n\nType 1 for academic, 2 for professional, 3 for government: ");
rewind(stdin);
scanf("%[^\n]",ans);
write(uhandle,ans,strlen(ans)+1);

for(i=1; i<=5; i++)
{
printf("\n\nType %d of 5 supplemental info lines (e.g., phone, address):\n",i);
rewind(stdin);
scanf("%[^\n]",ans);
write(uhandle,ans,strlen(ans)+1);
}
close(uhandle);
}
```

```
/* Module paintp updates the screen in page mode */

void paintp()
{
int index, i, j, pgdptr, numl, numr, skiplin, firstscr;
int left[30], right[30];
int xpos,ypos;
int idtot, ndash;

char id1[8],id2[8],id3[8];
char ppath[MAXPATH];
char tinfo[80],count[3],fx[80],val[80];

FILE *pg;

nspid[ps]=0; spfirst[ps]=0; splast[ps]=-1;
ips=ps;
xcerpt(1);
nspid[ps]=splast[ps]-spfirst[ps]+1;

/*  Screen heading  */
window(1,1,80,25);
clrscr();
printf("\nPrivatization Planner(tm)");
gotoxy(32,1);
if(nspid[ps] == 0) usepage = 0;
if(usepage > nspid[ps]) usepage = 1;
if((nspid[ps] > 0) && (usepage < 1)) usepage = 1;
printf("%s %d of %d",sptext[ps],usepage,nspid[ps]);
gotoxy(57,wt2-1);
time(timbuf);
printf("%s",ctime(timbuf));

/* Screen title */
gotoxy((80-strlen(t))/2,wt2);
printf("%s\n",t);

strcpy(id1,"default");
if(strcmp(userid,"") != 0) strcpy(id1,userid);
strcpy(id2,"default");
if(strcmp(idch,"") != 0) strcpy(id2,idch);
strcpy(id3,"default");
if(strcmp(varid,"") != 0) strcpy(id3,varid);
```

```
idtot=strlen(id1)+strlen(id2)+strlen(id3);
ndash=(80-47-idtot)/2;
for(i=1; i<=ndash; i++)
printf("-");
printf("You are %s, looking at the %s version,"
"with %s values.",id1,id2,id3);
for(i=1; i<=ndash; i++)
printf("-");

/* Page contents  */

if(splast[ps] >= spfirst[ps])   /* any pages? */
{
strcpy(ppath,drive);
strcat(ppath,&sp[ps][spfirst[ps]+usepage-1][0]);
printf("paintp: sp  %s",&sp[ps][spfirst[ps]+usepage-1][0]); /* zap */
pg=fopen(ppath,"r+");
strcpy(pagedata,"");
fread(pagedata,1,PAGELEN,pg);
fclose(pg);

xpos=wx1; ypos=wx2; nval=0;
for(numl=0,numr=0,pgdptr=0;pgdptr<strlen(pagedata);pgdptr++)
{
if(pagedata[pgdptr]=='{')
{
left[numl]=pgdptr;
xval[numl]=xpos;
yval[numl]=ypos;
numl++;
}

if(pagedata[pgdptr]=='}')
{right[numr]=pgdptr; numr++;}

if(strncmp(&pagedata[pgdptr]," ",1) >= 0)
xpos++; /* non-printing ctrl character? */
if((xpos > wt3) || (strncmp(&pagedata[pgdptr],"\n",1) == 0))
{xpos=1; ypos++;}
}

if(numl != numr)
{
```

```
gotoxy(wi1,wi2);
printf("mismatched number of '{' (%d) and '}' (%d)",
numl,numr);
}
else
{
nval=numl;
for(i=0; i<numl; i++)
{
lval[i]=right[i]-left[i]+1;
varval(i,val);
strnset(&pagedata[left[i]+1],' ',lval[i]-2);
for(j=left[i]+1; j<=right[i]-1; j++)
{if(val[j-left[i]-1] == '\0') break;
pagedata[j]=val[j-left[i]-1];}
}
}

gotoxy(wx1,wx2);
printf("%s",pagedata);
}

/* footer */
gotoxy(wf1,wf2);
printf("%s",
 " Page    Add   Replace   Delete   Values  Eval  Screen  User   Help   Quit");
gotoxy(wf1,wf2+1);
strcpy(fx,
 "  0                                                    mode   [id]");
if(nspid[ps] < 1) printf("%s",fx);
else
{
sprintf(fx,
 " 0-%2d    1-%2d   1-%2d     1-%2d                    mode   [id]",
nspid[ps],nspid[ps],nspid[ps],nspid[ps]);
printf("%s",fx);
/* gotoxy(80,25);
printf("");  auto-eject for hard copy of screen  */
}
}
```

```
/* Module paints updates the screen (in screen mode) */

void paints()
{
int index, i, i1, i2, skiplin, firstscr;
int idtot, ndash;

char id1[8], id2[8], id3[8];
char tpath[MAXPATH], *cwdext;
char tinfo[80],count[3],sx[80],fx[80];

FILE *ti;

nspid[ps]=0; spfirst[ps]=0; splast[ps]=-1;
ips=ps;
xcerpt(1);
  nspid[ps]=splast[ps]-spfirst[ps]+1;

/*  Screen heading  */
window(1,1,80,25);
clrscr();
printf("\nPrivatization Planner(tm)");
gotoxy(67,wt2-1);
time(timbuf);
printf("%s",ctime(timbuf));

/* Screen title */
gotoxy((80-strlen(t))/2,wt2);
printf("%s\n",t);

strcpy(id1,"default");
if(strcmp(userid,"") != 0) strcpy(id1,userid);
strcpy(id2,"default");
if(strcmp(idch,"") != 0) strcpy(id2,idch);
strcpy(id3,"default");
if(strcmp(varid,"") != 0) strcpy(id3,varid);

idtot=strlen(id1)+strlen(id2)+strlen(id3);
ndash=(80-47-idtot)/2;
for(i=1; i<=ndash; i++)
printf("-");
printf("You are %s, looking at the %s version,"
"with %s values.",id1,id2,id3);
for(i=1; i<=ndash; i++)
```

```
printf("-");


gotoxy(wx1,wx2);
printf("%s","S Next Higher Screen  (S0 for Root)");

if(splast[ps] < spfirst[ps]) goto skpdir; /* any subdirs? */


if(nspid[ps] == (wx4-wx2)) skiplin=0;
else skiplin=1;

firstscr=1;
if(nspid[ps] > (wx4-wx2))
{
gotoxy(wi1,wi2);
printf("Too many screens to fit!\n");
printf("Enter number of the first screen to display: ");
scanf("%d",firstscr);
}

i1=spfirst[ps]+firstscr-1;
i2=min(i1+wx4-wx2-1,splast[ps]);

for (i=i1; i<= i2; i++)
{
index=i-i1+1;

strcpy(tpath,drive);
strcat(tpath,&sp[ps][i][0]);
strcat(tpath,"\\");
strcat(tpath,"title");
/* printf("paints sp, tpath: %s  %s",&sp[ps][i][0],tpath); */

cwdext=strrchr(&sp[ps][i][0],'.');
/* printf("  cwdext: %s ",cwdext);   zap  */
if((cwdext != NULL) && (strlen(cwdext) <= 4))
strcat(tpath,cwdext);
/* printf("paints tpath: %s",tpath); rtrn();    zap */

ti=fopen(tpath,"r+");
strcpy(tinfo,tmok);
fread(tinfo,1,77,ti);
fclose(ti);
```

```
strcpy(sx,"S");
strncat(sx,itoa(index,count,10),2);
strcat(sx," ");
strncat(sx,tinfo,76);
gotoxy(wx1,wx2+index+skiplin);
printf("%s",sx);
}
skpdir:
 ;

/* footer */
gotoxy(wf1,wf2);
printf("%s",
 "Screen   Add   Replace   Delete   Title   Eval   Page   User   Help   Quit");
gotoxy(wf1,wf2+1);
strcpy(fx,
 "  0                                                mode   [id]");
if(nspid[ps] < 1) printf("%s",fx);
else
{
sprintf(fx,
 " 0-%2d    1-%2d   1-%2d      1-%2d                  mode   [id]",
nspid[ps],nspid[ps],nspid[ps],nspid[ps]);
printf("%s",fx);
}


}



void rtrn()
{
/* elicit carriage return so message can be seen */
printf("Type c and return to continue: ");
rewind(stdin);
scanf("%s",dum);
}
```

```
/* Module Survey determines what files are available
   upon entry to a new screen, flagging missing ones  */

void survey()
{
struct fcb fcb;
char *ptr, *cwdext, titfnm[10];
char buf[14],convrt[9];
int nmaps, nmapp, i;

if(output >= 3) printf("survey %s \n",getcwd(cwd,MAXDIR));

strcpy(titfnm,"title.");
getcwd(cwd,MAXDIR);
cwdext=strrchr(cwd,'.');  /* e.g., (.)abc  */
if((cwdext != NULL) && (strlen(cwdext) <= 4))
strcat(titfnm,cwdext+1);
/* printf("%s  %s  %s",cwd,cwdext,titfnm);rtrn(); zap*/

fcloseall();   /* clean slate */

if(((maps=fopen("maps","a+"))==NULL) && (output >= 3))
{printf("Cannot open MAPS.\n");
rtrn();}


if(((mapp=fopen("mapp","a+"))==NULL) && (output >= 3))
{printf("Cannot open MAPP.\n");
rtrn();}


if(((react=fopen("react","a+"))==NULL) && (output >= 3))
{printf("cannot open react.\n");
rtrn();}

if(((title=fopen(titfnm,"a+"))==NULL) && (output >= 3))
{printf("cannot open title.\n");
rtrn();}

nsptot[0]=0;
if(maps != NULL)
{
nmaps=fread(sparray,1,2400,maps);
rewind(maps);
```

```
ptr=strtok(sparray," \n");

for (i=0; ptr != NULL; i++)
{
strcpy(&sp[0][i][0],ptr);
ptr=strtok(NULL," \n");
if(strncmp(&sp[0][i][0],"U",1) == 0) continue;

if(findfirst(&sp[0][i][0],&ffblk,FA_DIREC) != 0)
{printf("cannot find %s.  ",&sp[0][i][0]);rtrn();}
}
nsptot[0]=i;
}
strcpy(sparray,NULL);

nsptot[1]=0;
if(mapp != NULL)
{
nmapp=fread(sparray,1,2400,mapp);
rewind(mapp);
ptr=strtok(sparray," \n");

for (i=0; ptr != NULL; i++)
{
strcpy(&sp[1][i][0],ptr);
ptr=strtok(NULL," \n");
if(strncmp(&sp[1][i][0],"U",1) == 0) continue;

if(findfirst(&sp[1][i][0],&ffblk,0) != 0)
{printf("cannot find %s.  ",&sp[1][i][0]);rtrn();}
}
nsptot[1]=i;
}
strcpy(sparray,NULL);

strcpy(t,tmok);

if(((title=fopen(titfnm,"r+")) == NULL) && (output >= 5))
printf("cannot open file %s", buf);

if(title != NULL) fread(t,1,80,title);
rewind(title);

}
```

```
void ucmnd(char whence[7])
{
FILE *title2;
int i, idexist, nbytes, offset;
char ufile[MAXPATH];

getcwd(cwd,MAXDIR);
strcpy(ufile,path);
strcat(ufile,"\\");
strcat(ufile,"users");
uhandle=open(ufile,O_RDWR|O_CREAT,S_IREAD|S_IWRITE);
lseek(uhandle,0,SEEK_SET);
nbytes = read(uhandle,usersinfo,USERSLN);
close(uhandle);
chdir(cwd);

  if(strlen(response) == 1)   /* just plain "U"  */
{
gotoxy(1,1); clrscr();
printf("Do you want the default ");
if(ps==0) printf("organization and contents (Y or N)? ");
else printf("values (Y or N)? ");
rewind(stdin);
scanf("%s",dum);
if(strncmpi(dum,"Y",1) == 0)
{
if(ps==0) strcpy(idch,"");
else strcpy(varid,"");
goto start;
}

offset=0;
while(offset < nbytes)
    {
ptr=&usersinfo[offset];
if(strncmp(ptr,UDELIM,1) == 0)
{
/* if no change, disregard */
if((ps==0) && (strcmp(idch,ptr+1)==0)) goto skipsame;
if((ps==1) && (strcmp(varid,ptr+1)==0)) goto skipsame;

gotoxy(1,1); clrscr();
printf("Userid= %s",ptr+1);
printf("   Name= %s\n",ptr+strlen(ptr)+1);
```

```
printf("Select this user's ");

if(ps==0) printf("organization and contents (Y or N)? ");
else printf("entries for variable values (Y or N)? ");
rewind(stdin);
scanf("%s",dum);
if(strncmpi(dum,"Y",1) == 0)
{
if(ps==0)
{
if(strcmp(ptr+1,userid)==0) goto adopt;
strcpy(idch,ptr+1);
}
else strcpy(varid,ptr+1);
goto start;
}
}
skipsame: offset=offset+strlen(ptr)+1;
    }
/* Future mod: splat all users for random not serial choice */
gotoxy(1,1); clrscr();
printf("No more users!  Try another command: ");
goto cmnd;
}

  else /* id appended */
{
idexist=0;
offset=0;
while(offset < nbytes)
{
ptr=&usersinfo[offset];
if((strncmp(ptr,UDELIM,1) == 0)
 &&(strcmp(ptr+1,&response[1]) == 0))
 {idexist=1; break;}
offset=offset+strlen(ptr)+1;
}

if(idexist==0)
{
gotoxy(1,1); clrscr();
printf("Id %s isn't available.  Try another command: ",&response[1]);
goto cmnd;
}
```

```
if(ps==1)
{
strcpy(varid,&response[1]);
goto start;
}

if(strcmpi(userid,&response[1]) != 0) goto term; /* own id entered */

/* adopt MAPS.idch ?? */
adopt: gotoxy(1,1); clrscr();
ips=0;
xcerpt(2);
if(splast[ips] < spfirst[ips])
printf("You do not yet");
else printf("You already");

  printf(" have a personal setup for the SCREEN layout.");
clreol();
if(strcmpi(idch,"") != 0) strcpy(dum,idch);
else strcpy(dum,"default (std)");
  printf("\nDo you want to adopt the %s version (Y or N)? ",dum);
clreol();
scanf("%s",dum);
if(strncmpi(dum,"Y",1) == 0)
{
adopt(0);  /* adopt organization */
/* adopt screen title as well */
unlink(fn2("title"));
if(((title2=fopen(fn2("title"),"w+")) == NULL)
&& (output >= 3))
{
printf("Cannot open title.userid.\n");
rtrn();
}
rewind(title2);
fwrite(t,1,80,title2);
}

/* adopt MAPP.idch ?? */
gotoxy(1,1); clrscr();
ips=1;
xcerpt(2);
if(splast[ips] < spfirst[ips])
```

```
printf("You do not yet");
else printf("You already");
printf(" have a personal setup for the  PAGE  layout.");
if(strcmpi(idch,"") != 0) strcpy(dum,idch);
else strcpy(dum,"default (std)");
  printf("\nDo you want to adopt the %s version (Y or N)? ",dum);
scanf("%s",dum);
if(strncmpi(dum,"Y",1) == 0)
adopt(1);  /* adopt contents */

term: if (ps == 0) strcpy(idch,ptr+1);

start: strcpy(whence,"start"); return;
prompt: strcpy(whence,"prompt"); return;
cmnd: strcpy(whence,"cmnd"); return;

}
}
```

```
/* Module updtf updates the maps, mapp and react files as appropriate */

void updtf()
{
int i;

if(updts != 0)
{
strcpy(sparray,"");

for(i=0; i <= nsptot[0]-1; i++)
{strcat(sparray,&sp[0][i][0]);
 strcat(sparray," ");}

fclose(maps);
unlink("maps");
if(((maps=fopen("maps","w+"))==NULL)&&(output>=3))
{printf("cannot create new MAPS.\n");rtrn();}
fwrite(sparray,1,strlen(sparray)+1,maps);
strcpy(sparray,NULL);
updts=0;
}

if(updtp != 0)
{
strcpy(sparray,"");

for(i=0; i<= nsptot[1]-1; i++)
{strcat(sparray,&sp[1][i][0]);
 strcat(sparray," ");}

fclose(mapp);
unlink("mapp");
if(((mapp=fopen("mapp","w+"))==NULL)&&(output>=3))
{printf("cannot create new MAPP.\n");rtrn();}
fwrite(sparray,1,strlen(sparray)+1,mapp);
strcpy(sparray,NULL);
updtp=0;
}

if(updtr != 0)
fseek(react,0,SEEK_END);
fwrite(r,1,strlen(r)+1,react);
strcpy(r,UDELIM);
```

```
strcat(r,userid);
strcat(r,"\n");
updtr=0;
return;
}
```

```
void varval(int i, char val[80])
{

char reactbuf[160];
int nfields, rightid;

strcpy(val,"");
fseek(react,0,SEEK_SET);
strcpy(reactbuf,"");
rightid=0;
while(fgets(reactbuf,160,react) != NULL)
{         /* allow for \0 character prefix  */
if(strncmp(&reactbuf[1],UDELIM,1) == 0)
{if(strncmp(&reactbuf[2],varid,strcspn(&reactbuf[2]," \n"))==0)
rightid=1;
else rightid=0;
continue;}
else
{
if(rightid != 1) continue;

ptr=strtok(reactbuf," \n");
if(strcmp(ptr,&sp[ps][usepage][0]) != 0) continue;

ptr=strtok(NULL," \n");
if(strcmp(ptr,"V") != 0) continue;

ptr=strtok(NULL," \n");
if(atoi(ptr) != i+1) continue;

ptr=strtok(NULL,"\n");
strncpy(val,ptr,lval[i]-2);
}
}


return;
}
```

```
void vcmnd(char whence[7])
{
int i,j;
char vbuf[160], convj[3];

for (i=0; i<nval; i++)
{
/* currently assumes value for variable on single line */
gettext(xval[i],yval[i],xval[i]+lval[i]-1,yval[i],vbuf);

for (j=1; j<=lval[i]; j++)
vbuf[2*j-1]=vbuf[2*j-1] | BLINK;

puttext(xval[i],yval[i],xval[i]+lval[i]-1,yval[i],vbuf);

gotoxy(1,1); clrscr();
printf("Do you want to enter a value for this variable (Y or N)? ");
rewind(stdin);
scanf("%s",dum);
if(strncmpi(dum,"Y",1) != 0) goto noblnk;
gotoxy(1,1); clrscr();
printf("Enter value (\" for the same):\n");
rewind(stdin);
printf("{"); gotoxy(lval[i],2); printf("}"); gotoxy(2,2);
scanf("%[^\n]",dum);
if(strcmp(dum,"\"") == 0)
{
for (j=1; j<=lval[i]-2; j++)
dum[j-1]=vbuf[2*j];
}

if(strcmpi(userid,varid) == 0)
{
for (j=1; j<=lval[i]-2; j++)
if(j <= strlen(dum)) vbuf[2*j]=dum[j-1];
else vbuf[2*j]=' ';
}
/* apend to buffer for react file */
strcat(r,&sp[ps][usepage][0]);
strcat(r," V ");
strcpy(convj,itoa(i+1,convj,10));
strcat(r,convj);
strcat(r," ");
```

```
strcat(r,dum);
strcat(r,"\n");
updtr=1;
updtf();


/* update screen (turn off blink)  */
noblnk: for (j=1; j<=lval[i]; j++)
vbuf[2*j-1]=vbuf[2*j-1] & (~BLINK);
puttext(xval[i],yval[i],xval[i]+lval[i]-1,yval[i],vbuf);
}
return;

}
```

```
/* Module xcerpt identifies id-specific maps or mapp entries */

void xcerpt(int iswitch)
{
char idcmp[6];

int i, first, last;

gotoxy(wi1,wi2);


first = 0;

strcpy(idcmp,"U");
if(iswitch == 1) strcat(idcmp,idch);
else strcat(idcmp,userid);
for(i=0; i<nsptot[ips]-1; i++)
if(strcmp(&sp[ips][i][0],idcmp) == 0) break;

first=i+1;
for(i=first; i<=nsptot[ips]-1; i++)
if(strncmp(&sp[ips][i][0],"U",1) == 0) break; /* &sp[ips][n][0]=don't care */

last=i-1;

spfirst[ips]=first;
splast[ips]=last;

return;
}
```

## Appendix 1: Data Files

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FORNDB Foreign Investor Data Base
GDB Government Data Base
PBDB Privatisation Board Data Base
TDB Testamentary Data Base

DF Disposition File

The serial Disposition File (DF) contains financial records to be transmitted to financial institutions which will act as custodians of the specified assets. It is created by module PASS5 and processed by module DISPOSE (see Appendix 2).

Format:

financial institution ID code:recipient ID code:
recipient name:address:phone:supplementary name:
asset1:amount1: ... asset n:amount n

Examples:

51100100FNMXYFNBR:19460630ERFXYCDEF:
Ellen Right:1040 Oak Terrace;Anywhere:555-1515:Smith:
PAYOUT;FNBR;940101;D;N;M:4.32%;1;985:250,000
[Financial institution FNBR is custodian of an annuity for individual ER, in the amount of 985 (local currency) to be paid monthly until her death, without right of survivorship. This amount was calculated from actuarial table #1, assuming an implicit interest rate of 4.32% and an initial investment of 250,000 (local currency).]

51100021MLMMLPF:19630704MRMXYBCDE:STLI:1000:
Michael Right:1040 Oak Terrace;Anywhere:555-1515:Tern:
SMU:1:DLEVR;01;8%:10,000
[Financial institution MLPF is custodian, on behalf of individual MR, of 1000 shares of STLI, 1 SMU and 10,000 (local currency) of 8% debt of LEVR which matures in the year 2001.

Certain assets such as debt and annuities (DXXXX, DIXXXX and PAYOUT) are automatically included in the Disposition File if the acronym embedded in the asset does not specify the government itself.

Other assets, such as Stock Market Units, enterprise stock, foreign currency (SMUs, EXXXX, FCXX) or government debt are included in the Disposition File only when so directed by a valid TRANSFER command (see Appendix 3).

**Note:**

**The asset amount must be in number of shares, number of SMUs, units of foreign currency, face value of debt (in local currency) or periodic annuity payments (in local currency). The asset amount cannot be expressed as a percentage of the portfolio contents.**

DFXXXX Disposition File: Excerpts

The serial Disposition File: Excerpts (DFXXXX) is generated by module DISPOSE and contains the information to be transmitted to a particular custodial financial institution.

Format:

Financial institution ID code:name:address:phone:supplementary name

Recipient #1 ID code:name:address:phone:supplementary name:
asset1:amount1: ... :asset n:amount n

.
.
.

Recipient #N ID code:name:address:phone:supplementary name:
asset 1:amount1: ... :asset n:amount n

DOFF Delegation Offer File

The serial Delegation Offer File (DOFF) contains a summary of all offers to delegate investment authority over assets. It is created by module PASS2, and then used by module DELCOMP to 1: calculate the minimum delegatee compensation thresholds, and 2: update file DORF with that information (see Appendix 2).

Record format:

delegatee acronym:asset value:compensation offer::

Examples:

INVI:10,000:10%E::
[There was an offer to delegatee INVI to accept investment authority over 10,000 (local currency) worth of assets (valued on the basis of price estimate #1 as generated by module PASS1), in return for 10% of subsequent earnings.]

INVI:100,000:.5%A::
[In this case, the delegation offer is for .5% of assets estimated to be worth 100,000 (local currency).]

DORF Delegatee Order File

The random access Delegatee Order File (DORF) contains, for each delegatee, its nonproprietary transactions and its minimum compensation threshold by assets and earnings. It is created by module DORFGEN (which precedes PASS1 and posts nonproprietary orders), and then updated by module DELCOMP (which follows PASS2 and posts minimum compensation thresholds). It is used by modules PASS1, PASS3, PASS4 and PASS5 (see Appendix 2) to determine what transactions the delegatees direct for assets in various portfolios.

Record format (standard XDB format):

transaction type:date entered:as of date:field 1: ... :field N::

The only transaction types posted are ACQUIRE, CANCEL, FILTER, IDENT, PERCENTAGE, REINVEST and WHEN (see Appendix 3). No proprietary transactions (relating to the delegatee's own assets) are posted. Room is reserved at the end for DELCOMP to update it with a PERCENTAGE record incorporating the final minimum compensation.

EPRISE Enterprise File

The random access Enterprise File (EPRISE) for a particular investment cycle contains, for each enterprise, its ID code (with embedded acronym), the number of shares held on the Privatise!™ system, and the dividend to be accrued per share and pricing information for the stock and any debt instruments. It is updated by module PASS1, which first scans the segment of the Transaction Data Base (XDB) containing enterprise transaction blocks to update EPRISE with information from DIVIDEND transactions. EPRISE is also updated by module PASS5, which posts any corrections to the numbers of shares resulting either from TRANSFER transactions (resulting in decreases due to transmittals to a custodial financial institution) or from "ACQUIRE for assets received (VAL)" transactions (resulting in increases due to share issuance). Finally, during each of PASS1, PASS3 and PASS4, module PRICING updates EPRISE with the latest calculations of asset prices.

File format:

SMU label: # SMUs: total dividend::
First SMU enterprise ID code: # shares: dividend:
stock price estimate #1:price estimate #2:final price:
debt instrument #1:price estimate#1:price estimate #2:final price:
...
debt instrument #N:price estimate #1:price estimate #2:final price::
.
...
.
Last SMU enterprise ID code: # shares: dividend: ...

SMU2 label: # SMU2s: total dividend::
First SMU2 enterprise ID code: # shares: dividend: ...
...
Last SMU2 enterprise ID code: # shares: dividend: ...

UNSMU label: total # shares: dividend::
First UNSMU enterprise ID code: # shares: dividend: ...
...
Last UNSMU enterprise ID code: # shares: dividend: ...

Notes:

1. While SMU2s can be created immediately, the list of identified SMU2 en-

terprises would remain empty until after the first privatization occuring after the date cut-off separating SMUs and SMU2s (see discussion in Appendix 4: SMU2).

2. "UNSMU" enterprises are those not included in either SMUs or SMU2s. They can arise either from private formation de novo, or by taking a SMU or SMU2 enterprise private by making a tender offer for all shares. Such a tender offer would be feasible even for an enterprise held by the entire citizenry as part of their SMUs, by means of polling techniques implemented by module EVOTE. If the tender offer were successful, it could be implemented by executing a DIVIDEND transaction corresponding to the total buyout price for shares remaining on the Privatize!$^{TM}$ system.

3. It is possible to create a new UNSMU asset comprised of qualifying enterprises on the system as of a fixed date. Until then, "UNSMU" is an acronym rather than an asset, and the total number of shares in the UNSMU record represents the sum of shares in all UNSMU enterprises, rather than the number of UNSMU stock "baskets."

4. In the context of the EPRISE file, the term "enterprise" includes tradeable-stock-based or debt-issuing organisations such as financial institutions.

5. The price for an enterprise may be in the form "lower bound; upper bound" if the arbitrage between SMUs and synthetic bids and offers leaves a price gap between the highest bid and lowest offer executed for shares in that enterprise.

ORDERS Order File

This serial file contains a set of all the orders to sell one asset and buy another which are to be used by module PRICING to calculate asset prices.

Format:

ID code #1::
asset1:price1:asset2:price2:amount2::
...
asset1:price1:asset2:price2:amount2::

ID code #N:: asset1:price1:asset2:price2:amount2::
...
asset1:price1:asset2:price2:amount2::

Copies of this file are created by modules PASS1, PASS3 and PASS4 using Transaction Data Block (XDB) information processed by module XBLOCK. Module PRICING is then invoked to process ORDERS to calculate asset prices.

PRICES Asset Price File

The random access Asset Price File (PRICES) contains price estimates and the final price for Stock Market Units (SMUs), foreign currency (FCDM and FCUS), debt of the government (e.g., DLEVR, DILEVR and PAYOUT;LEVR...). It is created and updated by module PRICING.

Format:

Investment cycle #1 price estimate #1
SMU, SMU2(null), FCDM, FCUS
government debt instrument #1 ... #n

Investment cycle #1 price estimate #2
SMU, SMU2(null), FCDM, FCUS
government debt instrument #1 ... #n

Investment cycle #1 final prices
SMU, SMU2(null), FCDM, FCUS
government debt instrument #1 ... #n

XDB Transaction Data Base

The serial Transaction Data Base (XDB) is the central file of the Privatise!™ system. It contains transaction blocks comprised of transaction records associated with a single ID code. An ID record begins a transaction block, which continues up to a "new line" character or the end of file.

File format:

| | |
|---|---|
| First Transaction Block | ID record<br>other transaction records<br>"new line" character |
| Second Transaction Block | ID record<br>other transaction records<br>"new line" character |
| . | |
| Final Transaction Block | ID record<br>other transaction records<br>End of file |

Transaction record format:

transaction type:date entered:as of date:field 1: ... :field N::

Field format:

subfield 1; ... ;subfield n

Thus, transaction blocks are delimited by ID records and a "new line" character or end of file mark, transaction records are delimited by two contiguous colons "::", fields are delimited by a single colon ":", and subfields are delimited by a semicolon ";". There are no other delimiters.

The Transaction Data Base is generated by module XACT (see Appendix 2). XACT allows input of any valid transaction records from any source (as legitimated by off-line procedures), including terminals or serial devices such as floppy disks or 8mm tape drives.

In the early stages of the update cycle of the Transaction Data Base, new transaction data can be viewed as compartmentalised into "logical subfiles" depending on their source, e.g.: ADB (Auction Data Base), CDB (Citizen Data Base), CHIDB (Charitable Institution Data Base), EDB (Enterprise Data Base), FIDB (Financial Institution Data Base), FORNDB (Foreign Investor Data Base), GDB (Government Data Base as subdivided by agency, e.g. PBDB Privatisation Board Data Base), TDB (Testamentary Data Base). While this "logical compartmentalization" can be useful in facilitating input procedures, audit trail backups and ancillary processing applications making additional use of the data, it is nonetheless completely transparent to the Privatise!$^{TM}$ software.

Module XACT maximally aggregates dispersed records for the same ID code into a single transaction block, and sorts the resulting transaction blocks, within the constraints of available memory and disk space. After an iterative sort procedure, the final result is a single, comprehensive, sorted XDB file. The final XDB file would typically be comprised of a series of 8mm tapes (or other high capacity storage media).

The comprehensive, sorted Transaction Data Base (XDB) is the basic file which Privatise!$^{TM}$ processes (in five passes) in order to: 1. determine delegations of investment authority; 2. establish asset prices; 3. execute orders as appropriate; 4. update portfolio valuations; and 5. generate the Disposition File for transmittal to custodial financial institutions.

Note:

The default numeric protocol is that a period "." denotes the decimal point and a comma "," is ignored as merely a devise to format large numbers. This default can be overriden by editing Included Module - GLOPARM (see Appendix 2). For example, by editing module GLOPARM as follows:

```
decpt = ','
numfmt = '.'
```

the defaults would be switched.

underlineAppendix 2: Software Modules


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48 Included Modules

ACRONYM
ANNUITY
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ACTUARY

ACTUARY calculates periodic annuity payments.

Input:

ID-code, interest rate, amount invested and PAYOUT subfields: begin; end; survive; frequency;implicit interest rate;actuarial table #.

Return:

Amount of periodic payments, for posting to the last PAYOUT subfield.

Processing Logistics:

Called internally by PASS6.

Module logic:

From the ID code and PAYOUT subfield "begin", ACTUARY determines the number of years (including fractional part) in the future of the first payment. The present value of a first payment of 1 is then calculated from the implicit interest rate. That present value is attenuated by the probability of survival according to the specified actuarial table if the ID code specifies an individual and the PAYOUT survive subfield was not set to S. The probability of survival is calculated from male and female lists of year-to-year survival probabilities. (Note that if survival probabilities are differentiated by sex, where females tend to be longer-lived their annuity payments would be smaller, magnifying any gender gap where females tend to have lower incomes. On the other hand, failing to distinguish between the sexes by using the same values in the male and female survival probability lists could reduce the incentive for males to invest in annuities.)

The present value of subsequent payments, until the end date or until the probability of survival becomes negligible, are progressively included into a cumulative present value. Finally, the amount of the periodic payments is calculated by dividing that cumulative present value (associated with periodic payments of 1) into the amount invested.

AUCTION

AUCTION supports the immediate bidding for small state enterprises with citizen Stock Market Units (SMUs).

Input:

Serial file: Sorted Transaction Data Base (XDB), or a subset of it.

Output Report:

List of individuals attempting to transfer away a total of more than 1 SMU, the total attempted transfer amount, and optionally the entire transaction block for those individuals.

Typical Usage:

A local governmental entity applies module AUCTION to all transaction data in its possession after determining successful bidders at auctions of small state enterprises such as shops (especially including the transaction data reflecting those successful bids, see Appendix 4: Virtual Assets - Small State Enterprise Rights [SSER]).

Since the assumption is that there will be an initial transferable allocation of 1 SMU to each citizen, a warning is reported if attempted cumulative transfers exceed 1. Note that after the first investment cycle, if a portfolio owner had acquired additional SMUs, the warning may prove to be a false alarm. Conversely, if not all SMU-transfer-transaction data (such as from other successful small state enterprise auction bids) is available to the local government, AUCTION could fail to warn of a potential over-transfer (which could result in restitution to the government of the acquired asset plus profits).

Module Logic:

Invoke submodule XBLOCK to evaluate the transaction block, suppressing invocation of the Delegatee Order File (DORF) and forcing the inclusion of all price-contingent transfers away of SMUs. Trigger reporting if cumulative transfer away of SMUs exceeds 1.

DELCOMP (Delegatee Compensation)

DELCOMP calculates the minimum thresholds of delegatee compensation as a percentage of assets and earnings.

Input:

Serial file: Delegation Offer File (DOFF)
Serial file: Transaction Data Base (XDB)

Output:

Random access file (updated): Delegatee Order File (DORF)

Typical Usage:

DELCOMP is run after PASS2 has created the Delegation Offer File (DOFF). The delegatee compensation thresholds posted to the Delegatee Order File (DORF) are subsequently used in PASS3 to establish final delegations.

Module Logic:

The Delegation Offer File (DOFF) is sorted by delegatee and by compensation offer. The transaction block for each delegatee is read into memory, along with the compensation offers from DOFF. Using the PERCENTAGE command specifications of the maximum amount of assets under discretion (as constrained by applicable law or regulation) and the percentage of assets to be selected on the basis of compensation by earnings, determine maximum asset amounts by earnings and assets. For each of those two categories, step down the sorted compensation offers (starting at the highest), cumulating offered amounts, until the maximum amount or the minimum price (from the PERCENTAGE command again) is reached (see Appendix 3: DELEGATE, note 1). The compensation threshold is set to the compensation offer at that point.

DISPOSE

DISPOSE prepares a Disposition Report (see Appendix 6) and appropriately excerpts from the Disposition File (DF) for transmittal to custodial financial institutions.

Input:

Serial file: Disposition File (DF)
Serial file: Transaction Data Base (XDB)

Report: Disposition Report
Serial file: Disposition File: Excerpts (DFXXXX)

Typical usage:

DISPOSE is run after PASS5 has generated the Disposition File. The Disposition File: Excerpts, along with a corresponding Disposition Reports (if appropriate), is then transmitted to each custodial financial institution.

Module logic:

DISPOSE first sorts the Disposition File by financial institution and sub-sorts by recipient ID. It then generates the Disposition File: Excerpt and any appropriate Disposition Report for each custodial institution after obtaining its ID record (containing address information) from XDB.

DORFGEN (DORF File Generator)

DORFGEN generates the random access Delegatee Order File (DORF) using information from the Transaction Data Base (XDB).

Input:

Serial file: Transaction Data Base (XDB)

Output:

Random access file: Delegatee Order File (DORF)

Module logic:

Read the delegatee-organisation section of XDB, and post to random-access DORF non-proprietary transactions of types: ACQUIRE, CANCEL, FILTER, IDENT, PERCENTAGE, REINVEST and WHEN.

Reserve room at the end of the posted transaction block for a PERCENTAGE record incorporating the final minimum compensation, to be posted by module DELCOMP.

Generate access-keys based on delegatee-organisation acronym for subsequent random access.

EGEN (Enterprise File Generation)

**EGEN generates and updates file the Enterprise File (EPRISE) with ID codes of all enterprises, distinguishing among SMU, SMU2 and UNSMU enterprises in the process.**

**Input:**

**Interactive date entry: Enterprise IDs and SMU category.**

**Output:**

**Random access file: Enterprise File (EPRISE)**

**Module logic:**

**Determine whether the EPRISE file exists yet. If not, prompt for the ID codes of all enterprises falling in the SMU, SMU2 (presumably none) and UNSMU categories respectively. Sort the enterprises by acronym and create EPRISE.**

**If EPRISE already exists, upon request display current enterprises and allow deletion or addition of specific enterprises.**

**Note:**

**When SMU enterprises "spin off" subsidiaries (e.g., to achieve demonopolisation goals), then the government agency maintaining the EPRISE file by means of module EGEN must insert the new spin-offs as SMU enterprises. If the restructuring is material to the original enterprise, any "surviving core" should also be treated as a new enterprise to avoid masking the discontinuity.**

EVOTE (Enterprise Vote)

EVOTE uses polling techniques to support enterprise shareholder votes in the context of extremely widespread share ownership.

Input:

For one or more enterprises: enterprise acronym, number of shares outstanding, threshold percentage ownership, requested number of names below threshold: N, output mode (mailing list or properly addressed copy of the decision to be voted on) and (if second output mode) text of decision to be voted on.

Output:

By enterprise, names and addresses of all large and N small shareholders and their percentage and number of shares, with a selection probability for small shareholders an increasing function of ownership percentage, either as mailing lists or mail-ready voting packets.

Module Logic:

Perform an initial scan on the Transaction Data Base (XDB) for large owners (i.e., above the threshold percentage) of the specified enterprises. Note that the set of tapes in the XDB series (which is sorted by ID code, including birth date for individuals) corresponding to citizens below a statutory minimum for voting in enterprise decisions can be omitted. For each ID code, invoke module XBLOCK to determine the quantities of each asset. For each enterprise in the input list, calculate the percentage ownership reflected in this transaction block. If it exceeds the threshold, "select" the ID code and cumulate its shares into "large shareholder total holdings." (In practice, depending on the threshold percentages, the initial large shareholder scan may be restricted to the sorted XDB tapes containing transaction data for governmental entities and organisations.)

Next, scan XDB for owners of percentages below the threshold. "Selection" in this case is made by a Monte Carlo technique, using a probability of:

$$Selection \quad probability = 1 - (1 - p)^S;$$

where S is the number of shares in the portfolio, and p is the selection probability for a single share as follows:

$$p = \frac{\mu(N)}{(small\ \ shareholder\ \ total\ \ holdings)};$$

where (small shareholder total holdings) equals (total shares outstanding) minus (large shareholder total holdings), N is the requested number of small shareholder names, and $\mu(N)$ is an array of values determined by the Poisson approximation to the binomial distribution as follows:

$$.5 = \int_0^N \frac{e^{-\mu}\mu^x}{x!}dx$$

This method of calculating selection probability of a small shareholder portfolio will yield approximately N small shareholder names (with a 50/50 probability of yielding either more or less).

"Selection" results in either the addition of the name, address and number and percentage of shares to a mailing list (partitioned into large and small shareholders), or else the automatic generation of a properly addressed set of all the voting decisions to be put to a particular individual or organization.

Notes:

1. If a particular individual or organization exceeds the threshold in at least one case, and is also "selected" as a small shareholder in another enterprise, two separately addressed mailings could be generated.

2. The output option of sorted mailing lists requires sufficient random access file space to retain all selected names and addresses. However, this capability can also include sorting by an address subfield (such as a zip code) or by the regional center initially registering the ID code (as a surrogate for the region of the current address) in order to expedite the mailing process.

3. For this service, each enterprise might be charged a fixed fee, plus a per-name fee based upon whether the program generates a mailing list or the actual mail. The threshold percentage ownership and the number of names requested

would presumably be a function of the importance of the decision, perhaps with statutory minimums.

4. Since EVOTE deals only with share ownership recognized by the Privatise!™ system, any shareholdings transmitted to financial institutions by TRANSFER transactions would have to be polled independently.

5. Where a "selected" individual or organization has validly delegated voting authority over at least some of its shares in the enterprise, separate selection probabilities are calculated by appropriately allocating portfolio shares between the portfolio owner and each organization to which it has delegated voting authority.

PASS1

PASS1 updates the Enterprise File (EPRISE) with information from current DIVIDEND transactions. PASS1 also estimates asset prices assuming all delegation offers above delegatee-specified minimums are consummated. In the process, it creates an updated Transaction Data Base (XDB) file containing reinvestment transactions based on portfolio earnings.

Input:

Serial file: Transaction Data Base (XDB)
Random access file: Delegatee Order File (DORF)

Output:

Random access file: EPRISE (updated with current dividends)
Random access file: PRICES (updated with price estimate #1)
Serial file: Transaction Data Base (XDB) (new copy)
Serial file: ORDERS (also used as subsequent input)

Module logic:

First scan the segment of XDB containing enterprise transaction blocks to update EPRISE with information from DIVIDEND transactions, cumulating the dividends to totals for SMUs, SMU2s or UNSMUs as appropriate.

Then process XDB (using module XBLOCK with the switch set to enable usage of file DORF), generate the ORDERS file for later use by PRICING, and create an update of XDB containing reinvestment transactions. These are formulated by cumulating portfolio earnings from equities (SMUs, SMU2s or enterprise holdings), government debt (i.e., not automatically posted to the Disposition File - DF) and foreign currency.

The cumulated earnings are then allocated to assets (via ACQUIRE transactions at prevailing prices) in accordance with any applicable REINVEST transaction or default.

PASS1 then invokes module PRICING which uses the ORDER file to generate price estimate # 1. Finally, PASS1 posts this estimate to file PRICES.

PASS2

PASS2 estimates asset values using price estimate #1 to value delegation offers and lending offers.

Input:

Serial file: Transaction Data Base (XDB)
Random access file: PRICES

Output:

Serial file: Delegation Offer File (DOFF)

Module logic:

Read a transaction block from XDB and call routine XBLOCK. Aggregate in memory offers to lend to potentially large borrowers, and upon completion generate a lending report (see Appendix 6) for the borrowers' evaluation.

After processing each transaction block, post delegation offers to file DOFF.

PASS3

PASS3 generates price estimate #2 using the final delegations posted by module DELCOMP to the Delegation Order File (DORF).

Input:

Serial file: Transaction Data Base (XDB)
Random access file: Delegatee Order File (DORF)
Random access file: PRICES

Output:

Random access file: PRICES (update with price estimate #2)
Serial file: ORDERS (also used as subsequent input)

Module logic:

Process XDB by invoking module XBLOCK and posting the returned array of orders to the ORDER file. Then invoke module PRICING which uses the ORDER file to generate price estimate #2. Finally, PASS3 posts this estimate to file PRICES.

PASS4

PASS4 uses price estimate #2 generated by PASS3 to decide whether to invoke ELSE transactions, and then calculates final asset prices.

Input:

Serial file: Transaction Data Base (XDB)
Random access file: Delegatee Order File (DORF)
Random access file: PRICES

Output:

Random access file: PRICES (updated with final prices)

Module logic:

Same as PASS3, except XBLOCK will return an order array which reflects price estimate #2 determining whether or not to invoke individual ELSE transactions.

PASS5

PASS5 uses the final asset prices generated by PASS4 to execute transactions, create an update Transaction Data Base (XDB) and generate the Disposition File (DF).

Input:

Serial file: Transaction Data Base (XDB)
Random access file: Delegatee Order File (DORF)
Random access file: PRICES

Output:

Serial file: Transaction Data Base (XDB) (new copy)
Serial file: Disposition File (DF)

Module logic:

PASS5 uses the same logic as PASS3 and PASS4, except that it makes use of final asset prices.

During processing of XDB, PASS5 also creates an updated version by:
1. inserting the final interest rate (price) as the last subfield in each debt instrument (DXXXX, DIXXXX);
2. inserting the final implicit interest rate (price), actuarial table # and periodic payment amounts (determined by invoking module ACTUARY) as the last three subfields in each annuity instrument (PAYOUT);
3. suffixing to each potentially price-dependent transaction (i.e., ACQUIRE, ELSE and DELEGATE) another record documenting whether it was executed, either yes: "Y:investment cycle #::" or no: "X:investment cycle #::";
4. calculating actual delegatee compensation and transfering a portion of the delegated portfolio to the delegatee's account, either as a fixed percentage (if compensation was based on assets) or a percentage based on calculated total return (if compensation was based on "earnings"); and
5. appending to each transaction block in the new XDB a summary record of the amounts of assets currently contained in the portfolio, along with a total valuation, as follows:

Z:asset 1:amount 1: ... :asset n:amount n:total valuation::

Finally, PASS5 generates the Disposition File (DF) by posting in the following format:

Recipient ID code:name:address:phone:supplementary name:
asset 1:amount 1: ... :asset n:amount n::

information which module DISPOSE will process for transmittal to custodial financial institutions.

PRICING

PRICING creates or updates file PRICES and updates file EPRISE. These files contain price estimates #1 and #2 and the final prices for assets in a given investment cycle.

Input:

Random access file: PRICES
Random access file: Enterprise File (EPRISE)
Serial file: ORDERS

Output:

Random access file: PRICES
Random access file: Enterprise File (EPRISE)
Serial file: ORDERS (sorted version)

Module logic:

PRICING iteratively calculates the "market-clearing" price for each asset which satisfies the largest quantity of bids and offers. In the case of an asset with a single offeror (or bidder) such as PAYOUT, DXXXX and DIXXXX, that offeror (in these cases) establishes the price and the execution quantity is the amount of bids at or above that price.

In the case of assets with multiple bidders and offerors, at the "market-clearing" price the amount of bids at or above it is equal to the amount of offers at or below it. PRICING finds this price by first calculating a complete cumulative offer-amount array (starting at the lowest offer and working upward), and then calculating the corresponding cumulative bid-amount array (starting at the highest bid and working downward) until the cumulative bid-amount equals or exceeds the cumulative offer-amount.

In the case of transactions involving cross-prices, where a price-contingent bid uses the proceeds of a price-contingent offer, the bid amount will be a function of the market price obtained for the offered asset.

In particular, if agent-i bids $p_{ij}$ for instrument-j, using the proceeds from offering amount-$q_{ijk}$ of instrument-k at price-$p_{ik}$, and if the market prices are cor-

respondingly $P_j$ and $P_k$, this is equivalent to the following bid for instrument-j:

$$\text{amount-j} = q_{ijk}\,\frac{P_k}{P_j},$$

$$\text{if} \quad \frac{P_j}{P_k} \leq \frac{p_{ij}}{p_{ik}};$$

and a corresponding offer for instrument-k:

$$\text{amount-k} = q_{ijk};$$

$$\text{if} \quad \frac{P_k}{P_j} \geq \frac{p_{ik}}{p_{ij}}.$$

If at least one of the two price contingencies is an interest rate, then the cross-price constraint is broken out into its component constraints which must be independently satisfied:

$$P_j \leq p_{ij},$$

$$\text{and} \quad P_k \geq p_{ik}.$$

If the bid-for instrument has no price contingency (i.e., the price in the corresponding ACQUIRE transaction equals 0), then set:

$$p_{ij} = \text{MIN(default maximum price, } P_j).$$

If the offered instrument has no price contingency, then set:

$$p_{ik} = \text{MAX(default minimum price, } P_k).$$

The default maximum and minimum prices are designed to be reasonable constraints, and are set at a particular percentile along the spectrum of price-dependent bids and offers respectively.

Applying these principles to the assets in the Privatize!$^{TM}$ system, PRICING first reads the ORDERS file and sorts it by asset kind and price contingency. It then obtains the latest market price estimates from files PRICES and EPRISE. Estimates of prices for the single-offeror assets (DXXXX, DIXXXX and PAYOUT) are calculated. Then prices are estimated for foreign currency assets (FCDM and FCUS) assuming cross-price contingencies and multiple bidders and offerors.

At this point, the price of a SMU is calculated assuming cross-price contingencies and multiple bidders and offerors. In addition, arbitrage is automatically performed between SMUs and the component enterprise shares. When calculating the cumulative offer-amount array for SMUs (starting at the lowest SMU offer and working upward), the lowest offers for enterprise shares which make up a SMU are aggregated if they represent a complete set, and treated as "synthetic" but legitimate SMU offers. The execution of synthetic offers increases the amount of actual SMUs by transforming a complete set of enterprise shares into SMUs.

The cumulative bid-amount array for SMUs (starting at the highest SMU bid and working downward) is likewise augmented by synthetic SMU bids composed of the aggregation of the highest bids for enterprise shares which make up a SMU. In this case, a complete set of bids is unnecessary, and any unbid-for enterprise shares (or bid at less than a statutory minimum to prevent private parties from "vacuuming up" large quantities of shares at de minimis prices) in executed synthetic SMU bids are allocated to a government account. In effect, by operating the system, the government automatically reaps the rewards of arbitrage between SMUs and enterprise shares.

After determining the price of a SMU, prices are calculated for shares in individual enterprises. This again proceeds on the assumption of cross-price contingencies and multiple bidders and offerors. However, the amount of shares allocated to executed synthetic SMU bids and offers are first subtracted from the cumulative bid-amount and offer-amount arrays respectively.

After an iteration of estimating asset prices, the process is repeated so that bid-amounts which are a function of other asset prices can be approximated more closely. Therefore, using the new asset price estimates, updates estimates are prepared in turn for single-offeror assets (DXXXX, DIXXXX and PAYOUT), foreign currency (FCDM and FCUS), Stock Market Unit (SMU) and enterprise shares (EXXXX). Iterations continue until price estimates sufficiently converge. These prices are then posted to files EPRISE and PRICES.

Notes:

1. Subsequent to the first investment cycle, non-PAYOUT debt in the government (e.g., DLEVR, DILEVR) will be subject to the possibility of multiple offerors and be processed accordingly. This will necessitate adjustments to the face value of debt being liquidated, to take into account changes in net present value due to changes in price (i.e., interest rate).

2. When appropriate, PRICING will use the SMU pricing technique to calculate the price of a SMU2, an UNSMU or industry-specific "sub-baskets" which hierarchically comprise any of those three stock "baskets." Note that hierarchical "sub-baskets" could not only promote efficient capital formation by presenting investment vehicles for emerging industries, but they would also provide the opportunity for additional government arbitrage income.

3. When investors become more experienced, it may be useful to offer the ability to bid or offer at prices equal to an investor-specified percentile along the spectrum of price-dependent bids or offers.

XACT

XACT generates the Transaction Data Base (XDB).

Input:

Transaction records from serial device(s).

Output:

Maximally sorted transaction records to a serial device.

Module Logic:

This module accepts transaction records (from any available device, e.g. terminal, diskette or tape), optionally performing a preliminary validity check. Transaction blocks containing records in error are either directed to an alternate output device for subsequent review and correcting, or else to a terminal operator. The terminal operator could either correct a terminal-entered record, or inject appropriate CANCEL, substitute and NOTE records in the case of an erroneous record entered from another device (in the interest of preserving a complete audit trail).

The transaction records are then posted to an array of transaction blocks in main memory. This array is sorted (by ID code) when full or upon completion, and transferred to a disk file if available. This process is iterated until completion or until no more disk space is available. Then the disk files (if available) are merge-sorted to a serial output device writing to media such as diskettes (each holding about 1 megabyte of data) or 8mm tapes (each holding up to 5 gigabytes [sic] of data).

XACT processes all possible transactions from all recognised entities. The intermediate product is a set of diskettes or tapes, sorted at an intermediate level (i.e., chunks corresponding to the amount of main memory or disk memory available, whichever was greater, will be sorted "intra-chunk", but without any "inter-chunk" sorting).

In practice, data entry will likely be compartmentalized in the initial stages into what can be considered "logical sub-files", e.g.:

1) Citizen Data Base (CDB), comprising transaction records for individual citizens. This can range from simply the entry of an ID record (which could be coordinated with voter registration or adapted from other governmental data bases, and would correspond to an initial census), to a comprehensive set of transactions to buy or sell different assets or authorize delegation of investment authority.

2) Auction Data Base (ADB), comprising the exchanges of SMUs for SSERs (see Appendix 4: Virtual Assets: Small State Enterprise Rights). These transactions would typically result from successful bids at local auctions. The governmental entity arranging the auction, which would presumably obtain a percentage of successful bids, would use module AUCTION to try to ensure that individuals do not transfer more than their allotment (i.e., one) of SMUs (subject to restitution of any SSERs).

3) Testamentary Data Base (TDB), comprising transactions to dispose of the portfolio of a deceased individual. These would typically be generated by appropriate local authorities after processing any will or conducting any "probate."

4) Enterprise Data Base (EDB), Financial Institution Data Base (FIDB), Charitable Institution Data Base (CHIDB), Foreign Investor Data Base (FORNDB), Government Data Base (GDB), Privatization Board Data Base (PBDB) would each likewise comprise transactions submitted by the respective entities.

However, it should be emphasized that these "logical sub-files" are actually just parts of a single Transaction Data Base (XDB), and any "logical distinctions" are transparent to the Privatize!$^{TM}$ software system. Indeed, in its final mode, XACT reads input from multiple devices (such as 8mm tape drives), repeats the transaction validity check, performs an ID code merge-sort irrespective of the "logical sub-file" source, and outputs to another device (such as an 8mm tape drive again). By appropriately iterating this process, an incompletely sorted Transaction Data Base (XDB) of even very great size can be sorted completely and effectively.

Notes:

1. A subsequent version (MXACT: Multi-user XACT) will allow multiple users on a single computer to simultaneously input transaction records, again to be sorted in main memory and posted to a user-specific disk file. When the first user-specific disk file is filled, a flag will signal all program copies to close out their current disk files and open alternates to continue processing. This will trigger another program copy to merge-sort the closed disk files to the serial output device. However, this module will likely not be portable between operating systems or even computer lines.

2. XACT automatically checks for and when necessary generates appropriate transactions to initially transfer SMUs or SMU2s to citizens.

## XBLOCK

XBLOCK analyses a transaction block (i.e., all the transactions for a particular ID code) in the Transaction Data Base (XDB).

Input:

Parameters: transaction data block for an ID code, and a switch which specifies whether to invoke the Delegate Order File (DORF).
Global data: Asset prices by investment cycle.
Random access file: Delegatee Order File (DORF).

Return:

1. Number of kinds of assets ever in the portfolio, total portfolio valuation.
2. An asset array containing: asset kind, cumulative transfers, current asset quantity, asset price, asset value. The array is sorted by last date the asset was contained in the portfolio, and subsorted by asset value.
3. An array of orders to input to module PRICING: (asset1,price1,asset2,price2,amount2).

Processing Logistics:

Called internally by software modules as necessary (e.g., AUCTION, PASS1-5).

Included Module - GLOPARM (Global Parameters)

Policy choices
compmna: compensation minimum as % of assets.
compmne: compensation minimum as % of earnings.
compmxa: compensation maximum as % of assets.
compmxe: compensation maximum as % of earnings.
maxfilt: maximum number of simultaneously operative filters.

Technical specifications
bdlim: block delimiter "newline character".
decpt: decimal point ".".
fdlim: field delimiter ":".
nfield: null field "na".
numfmt: number formatter ",".
rdlim: record delimiter "::".

Appendix 3: Transaction Commands (with allowed abbreviations)

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50 ACQUIRE (ACQ A)

52 BANK (B)

53 CANCEL (CXL C)

54 DELEGATE (DLG D)

56 DIVIDEND (DIV V)

57 ELSE (E)

58 FILTER (FLT F)

60 GRADE (G)

61 IDENT (ID I)

63 JOIN (JN J)

64 LEAVE (LV L)

65 NOTE (N)

66 OVERSIGHT (OVER O)

68 PERCENTAGE (PER P)

69 REINVEST (RNV R)

70 SECURITY (SEC S)

72 TRANSFER (XFER T)

73 WHEN (W)

ACQUIRE (ACQ A)

Syntax:

ACQ:date entered:as of date:asset1:price1:asset2:price2:amount2::

ACQUIRE attempts to obtain asset1 at price1 or better by selling amount2 of asset2 at price2 or better. These constraints are relaxed to a single cross-rate constraint (unless an interest rate instrument such as DXXXX or PAYOUT is involved) as follows:

Bid for asset1 at a cross-price of price1/price2 in an amount equal to

amount2 * (market-price2/market-price1)

along with a corresponding offer for asset2 at a cross-price of price2/price1.

See Appendix 4 for asset categories.

Specifying a price of 0 for either asset1 or asset2 suppreses that price criterion. In that case, the bid or offer is no longer a cross rate, and is executed if the non-zero price is satisfied. If both prices are 0, then amount2 of asset2 is sold at whatever market-price2 is determined to be, and those proceeds are used to purchase asset1 at whatever market-price1 is determined to be.

Examples:

ACQ:':931231:ESTLI:10:SMU:25000:.5::
[The apostrophe indicates the previous entry date is used. The transaction is to take place "as of" December 31, 1993. Shares in the enterprise STLI are to be bought at a price of no more than 10 (local currency) per share, using the proceeds from the sale of .5 SMUs at a price of no less than 25000 (local currency) per SMU. The prices need not be satisfied independently, but are considered to be a cross-rate.]

ACQ:':93:DLEVR;01:8%:SMU:0:25%::
[The previous entry date is used, and the transaction is to take place "as of" 1993 on the default (for the ACQ transaction) date of December 31. Debt of LEVR to mature in the year 2001 is to be bought at an interest rate of no less than 8% (the % sign is optional here), in exchange for 25% of the SMUs in the portfolio (here the % sign is necessary to distinguish from an absolute amount of SMUs) to be sold at whatever the market price is determined to be.]

ACQ:':':PAYOUT;FNBX;940701;981001;S;M:4%:SMU:10000:20%::
[An annuity to be paid by financial institution FNBX extending from July 1, 1994 to October 1, 1998, with a right of survivorship and monthly payments, is to be purchased if the implicit interest rate is at least 4% (on the basis of a standardised actuarial table), with the proceeds from the sales of 20% of the SMUs in the portfolio at a price of at least 10000.]

ACQ:':':FCDM:75:SMU:0:5%::
[Acquire deutsche marks at 75 (local currency) per DM or better using proceeds from selling 5% of SMUs in the portfolio. The deutsche marks are to be kept in an interest bearing account (with short term maturity less than 1 year).

Notes:

1. An ACQUIRE transaction is only valid for one investment cycle. For example, for a calendar-year annual investment cycle, any ACQUIRE with an "as of" date in 1992 and entered by the cut-off date would be a candidate for executing during processing in early 1993, after which it would expire. However, if the "as of" date were in 1993, it would be skipped over until the next processing cycle.

2. If an enterprise offers shares of itself in excess of its "treasury shares", that is equivalent to a stock subscription (and presumably subject to regulatory oversight).

3. Certain assets cannot be used in the place of "asset2" to ACQUIRE other assets by any entity other than the issuer. For example, debt (DXXXX, DIXXXX and PAYOUT) is transmitted to custodial financial institutions via the Disposition File (DF). (Early liquidation of such debt instruments will likely entail negotiations with or through the custodial financial institution.) Even government-backed annuities (PAYOUT) are invalid as "asset2" (to prevent processing and asset-debasement difficulties). Therefore, the only debt-based instrument eligible to be used as "asset2" by an entity other than the issuer is debt of the government (e.g., DLEVR). Even this will not be supported in the first investment cycle, since there will be no such loans on the system initially. When it is allowed for entities other than the government to offer their holdings of its debt (which will aid in interest rate price discovery), adjustments to the face value of debt being liquidated will be made to take into account changes in net present value due to changes in price (i.e., interest rate).

4. Note that the government can enter ACQUIRE transactions, presumably with suitable public notice, to auction off bundles of SMUs or shares in specific enterprises at or above a fixed asking price.

BANK (B)

Syntax:

BANK:date entered:as of date:acronym::

BANK is entered by an enterprise to specify the financial institution which will process its debt payments.

Example:

ID:930415:931231:421145000SIEXYSTLI::
BANK:':':FNBR::
[Enterprise STLI specifies financial institution FNBR as its debt processing agent, as substantiated by any required off-line agreements and oversight approvals.]
ACQ:':':DFNBR;D:0:DSTLI;99:8%:100,000::
[STLI offers to borrow 100,000 (local currency) at 8% or less, to be repaid in 1999. In this case, any proceeds are to be held as a demand deposit with FNBR at prevailing rates.]
ID:930630:931231:19601120JSMXYJKLM::
ACQ:':':DSTLI;99:8%:DLEVR;D:0:50,000::
[Individual JS offers to liquidate 50,000 (local currency) of his demand loan to LEVR, and use those proceeds to lend to STLI at 8% or more, with the principal to be repaid in 1999.]

In this example, the loan would be consummated in an amount of 50,000 (local currency). Module PASS5 posts the resulting asset (in the form of a loan) of individual JS to the Disposition File (DF). Module DISPOSE includes a record for this asset in the Disposition File: Excerpt sent to financial institution FNBR (DFFNBR). Each year, STLI must then pay 4,000 (local currency) to FNBR for distribution to JS.

CANCEL (CXL C)

Syntax:

CXL:date entered:as of date:asset-specific ACQUIRE, PREVious or ALL transaction(s)::

This command provides the ability to cancel previous transaction(s) which have not yet been executed.

Examples:

CXL:931015:931015:ALL::
[Cancel all previously entered (but as yet unexecuted) transactions for this ID.]

CXL:':':SMU::
[Cancel previous transactions to acquire SMUs.]

CXL:940125:940125:PREV::
[Cancel previous transaction. This might be inserted during processing and a substitute transaction entered, if an error is detected.]

Notes:

1. Subsequent transactions with a "date entered" later than the CANCEL "as of" date are not canceled.

2. Transactions which were entered before the CANCEL "as of" date are not canceled if they were executed (i.e., an asset was already exchanged for another).

DELEGATE (DLG D)

Syntax:

DLG:date entered:as of date:delegated authority (Invest, Vote):
asset(s):amount:delegatee-acronym:compensation(as % of Assets or Earnings)::

This transaction delegates either investment or voting authority over specified assets to the identified delegatee-organization.

Examples:

DLG:':':I:SMU:20%:INVI:10%E::
[Investment authority over 20% of the SMUs in the portfolio is offered to the delegatee organization INVI (which must be approved and registered) at a compensation of 10% of the subsequent earnings, taken to mean total return, including interest, dividends and stock appreciation (which will reflect the delegatee's investment decisions).]

DLG:':':I:SMU:10%:INVI:1%A::
[Investment authority over 10% of the SMUs in the portfolio is offered to delegatee organization INVI, at an annual compensation of 1% of the Assets, to be transferred without liquidation. Therefore, if the offer to delegate is consummated, and if there had been 1 SMU in the account, then .001 SMU (1% of 10% of 1) would be transferred from the portfolio to the delegatee organization.]

Notes:

1. Each delegatee organization must be approved and registered, with a maximum amount of assets under its discretion set at the lowest of: a statutory maximum, a limit set upon registration (based upon the organisation's financial resources and perhaps the experience of its personnel), and a lower limit of its own choosing. Perhaps delegatee organisations should be forbidden from purchasing for their own account assets vulnerable to manipulation, such as stock in individual enterprises. Offers to delegate are ranked in order of compensation in two lists (one for compensation as a percentage of assets, the other for compensation as a percentage of earnings).

The delegatee-organization has the option to establish minimum percentage compensation (by assets and earnings) which it will accept, and must specify in advance what percentage of the assets under its discretion is to be selected on the basis of asset-related compensation versus earnings-related compensation (see the PERCENTAGE command). For example, a delegatee organisation with an aggressive investment philosophy might specify that only 10% of the assets

under its discretion is to be selected from the highest compensation offers as a percentage of assets, while 90% is to be selected from the highest compensation offers as a percentage of earnings.

The actual compensation for all delegations is set at the lowest accepted offer (in the appropriate category), except that the lowest offers are truncated if they would reduce delegatee remuneration (i.e., if lowering the actual compensation rate would more than offset the increase in total amount). If the offered price P is expressed as a function of cumulative amount Q (starting from the highest offers), this is equivalent to solving for Q-accepted by:

maximizing: P(Q) x Q;
subject to: Q-accepted $\leq$ Q-maximum-authorized;
and: P(Q-accepted) $\geq$ P(minimum-acceptable);

and setting the price for all accepted delegations equal to P(Q-accepted). The list of registered delegatee organizations, a description of their personnel and expected investment approach, the percentage of assets to be accepted on the basis of assets versus earnings, and the maximum amount to be accepted should be regularly published.

2. Statutory constraints such as the prohibition of the sale of stock voting authority (especially over individual enterprises), as is the case in Western systems such as the United States to prevent abuse, can easily be implemented by setting the maximum compensation offer at zero. The result would in effect be a continuing and comprehensive "proxy" delegation.

3. If an individual acquires authority to enter transactions for the portfolio of another individual (such as an adult child being asked by an elderly parent to manage a portfolio), the responsibility for authentication rests with the same agency authenticating transactions entered by the actual portfolio owner. In other words, "delegation" (voluntary or otherwise) to an individual is transparent to Privatize™, and is authenticated by the "personnel" and/or "paperwork" system.

4. DELEGATION transactions entered by delegatee-organizations themselves are not allowed (except for their proprietary assets, when it might even be required). In other words, redelegation is not allowed. This is to prevent nearly intractable processing difficulties, in addition to avoiding the potential for an inappropriate convergence of investment strategies.

DIVIDEND (DIV D)

Syntax:

DIVIDEND:date entered:as of date:total dividend payment::

DIVIDEND is entered by an enterprise, and specifies the total dividends which it has paid over to be allocated to shares contained in the Privatize!$^{TM}$ system. Module PASS1 uses this information in the process of calculating total portfolio earnings for reinvestment.

Examples:

DIVIDEND:':'100,000::
[This enterprise has paid over 100,000 (local currency) to be proportionately allocated as dividends to all its shares on the Privatize!$^{TM}$ system.]

ACQ:':':VAL:S:DLEVR;D:S:100,000::
DIVIDEND:':':100,000::
[This enterprise has extinguished 100,000 (local currency) worth of debt in LEVR for value received. That value received is the credit of 100,000 (local currency) to be distributed as dividends.]

Notes:

1. DIVIDEND is only valid in the transaction block of an enterprise.

2. An appropriate government agency (such as the Privatization Board) must authenticate the transfer of sufficient resources to fund a DIVIDEND transaction.

3. This transaction can also be used to distribute payments to shareholders as a result of a successful tender offer to take an enterprise private (see discussion in Appendix 1 - EPRISE, note 2).

ELSE (E)

Syntax:

ELSE:ACQ:date entered:as of date:asset1:price1:asset2:price2:amount2::

ELSE is designed to provide the option to execute an alternative ACQUIRE transaction if a primary DELEGATE or ACQUIRE transaction fails to be executed. This is intended to somewhat compensate for the significant interval in the investment cycle.

Examples:

DLG:':':I:SMU:20%:INVI:10%E::
ELSE::ACQ:':':DLEVR;D:0:SMU:0:20%::
[Offer to delegate investment authority over 20% of the portfolio SMUs to delegatee INVI in return for 10% of earnings. However, if the offer is not consummated, exchange those SMUs for a demand loan to LEVR at prevailing prices.]

ACQ:':':DLEVR;D:10%:SMU:25000:20%::
ELSE:ACQ:':':FCDM:75:SMU:15000:20%::
[Attempt to sell 20% of the portfolio SMUs at a price of at least 25000, and use the proceeds to purchase a demand loan to LEVR at an interest rate of at least 10%. However, if either price can't be obtained, then attempt to sell 20% of the portfolio SMUs at a price of 15000 or better, and use the proceeds to purchase deutsche marks for 75 or better (taking the prices to mean a cross-rate).]

Notes:

1. ELSE can only follow a DELEGATE or ACQUIRE transaction.

2. The body of an ELSE can only be an ACQUIRE transaction.

3. If the ELSE follows an ACQUIRE, the asset pairs cannot be the same, in order to avoid wasteful processing overhead. For example, in the second example above, the prices of 25000 and 10% could not merely be relaxed to 20000 and 8% respectively in the subsequent ELSE transaction. For the purpose of this comparison, all debt of any particular entity is considered to be the "same" asset irrespective of maturity.

FILTER (FLT F)

Syntax:

FILTER:date entered:as of date:label:
account type:ID-acronym:birthdate interval:sex:asset(s):amount interval::
or
FILTER:date entered:as of date:label::

Filter is a transaction entered only by a delegatee organization (or the government itself) so that subsequent transactions only apply to selected portfolios or assets. Account type is a single letter (C,F,M,N,E,D or G) as follows: Citizen, Foreign investor, financial institution (Money), charitable institution (Need), Enterprise, Delegatee or Government. Delegatee transactions not preceded by a FILTER command apply to all assets under its discretion, both its own proprietary assets and those for which investment authority has been delegated to it. In practice, a delegatee-organization should initiate its transaction block with a pair of FILTER statements keyed to its own acronym, bracketing the transactions applicable to its proprietary account.

Examples:

FILTER:':':proprietary account:D:INVI::
...
FILTER:':':proprietary account::
[The transactions bracketed by the two FILTER transactions labelled "proprietary account" apply only to assets owned by the delegatee-organisation INVI itself.]

FILTER:':':boomers:C:na:19501001;19601231:X:SMU:.5;2.5::
...
FILTER:':':boomers::
[The transactions bracketed by the two FILTER transactions labelled "boomers" apply only to delegations by Citizens born between October 1, 1950 and December 31, 1960, whose account (including the non-delegated portion) contains between .5 and 2.5 SMUs.]

FILTER:heavy metal:E:STLI::
...
FILTER:heavy metal::
[The transactions bracketed by the two FILTER transactions labelled "heavy metal" apply only to delegations by Enterprise STLI.]

Notes:

1. Multiple filters (up to a maximum number equal to MAXFILT) can be simultaneously operative for a given delegatee, either nested or intersecting.

2. Inapplicable trailing fields can be omitted, as in the example labeled "heavy metal."

3. Matching FILTER transactions, and the transactions which they bracket, are considered a sub-block and kept intact throughout the merge-sorting of the Transaction Data Base (XDB).

4. FILTER sub-blocks entered by the government itself are always executed even if not "invoked" by the destination portfolio. For example, the government could initially allocate .5 SMUs to the "social security" account of all citizens born on or before January 1, 1928 with the following transactions:

```
FILTER:':':pensioners:C:na:18700101;19280101:na:na:na::
SECURITY:':'::
ACQ:':':SMU:S:LSER:S:.5::
SECURITY:':'::
FILTER:':':pensioners::
```

GRADE (G)

Syntax:

GRADE:date entered:as of date:evaluator acronym:evaluatee acronym:evaluation::

GRADE allows an authorized evaluator organisation to enter its evaluation of another organization which is capable of standing behind debt or an annuity. The evaluation is entered on a scale of 0 to 100, with a standardized interpretation of various scores to be promulgated by the government agency capable of authorizing organizations to enter such evaluations. This grading information is used to inform the public. Collective grading information can also be used to aggregate bids and offers of comparable organizations in the process of estimating market-clearing interest rates and generating a lending report to update borrowing transactions.

Example:

GRADE:':':SNP:MLPF:90::
[Authorized evaluator organization SNP grades the financial stability and creditworthiness of organization MLPF at 90.]

IDENT (ID I)

Syntax:

ID:date entered:as of date:ID code:name:address:phone:supplementary name::

ID identifies the entity which owns and controls a portfolio (either a Citisen, Foreign investor, Enterprise, financial institution [Money], charitable institution [Need], Delegatee organization, or Government). It remains operative for subsequent transactions until another ID transaction is entered. The contiguous set of transactions associated with a particular ID is termed a "block."

Examples:

ID:930215:930101:19601120JSMXYJKLM:John Smith:
100 Main Street; Anywhere:555-1212(h);555-1213(w):Jones::
[Field 4: This is a citizen (the first digit in the ID code is a 1 or 2) born November 20, 1960, with initials JS, Male, with ID first issued by regional center XY, and distinguishing personal code of JKLM. Field 5: name. Field 6: address. Field 7: telephone(s) (if any). Field 8: mother's maiden name.]

ID:930215:930101:34567890IUAXYQRST:Investors Unlimited:
100 Geldstrasse;Zurich, Switzerland:01/012/555-1111:Manfreq Q. Contact::
[Field 4: Foreign investor (first digit is a 3, while the following digits can be used to code individuals versus organizations), initials IU, Alien, ID first issued by processing center XY, distinguishing code QRST. Fields 5-7: name, address, telephone(s). Field 8: contact person.]

ID:930215:930101:42114500OSIEXYSTLI:Steel Inc.:
1 Steel Inc. Plaza;Steel City:555-5555:Steely Dan Executive::
[Field 4: Enterprise (first digit a 4), industrial code = 21, enterprise # = 45000 (independent of industrial code), initials SI, Enterprise, ID first issued by process center XY, enterprise acronym STLI (should be unique and correspond to enterprise #). Fields 5-7: name, address, telephone(s). Field 8: contact person (presumably CEO).]

ID:930215:930101:51100100FNMXYFNBR:First National Bank of Rocket City:
1 First National Bank Plaza;Rocket City:555-6666:Rock E. Fella::
[Field 4: Financial institution (first digit a 5), with financial institution code (e.g., bank, insurance company, pension fund, brokerage house, evaluator-organization) of 11, financial institution # = 100 (independent of financial institution code), initials FN, Money, ID first issued by processing center XY, financial institution acronym FNBR.]

ID:930215:930101:60100001CVNXYSOSV:Friends of SOS Childrens' Villages International:1170 Broadway;NY;10006::
[Field 4: charitable institution (first digit a 6), with charitable institution code of 01, charitable institution # = 001 (independent of charitable institution code), initials CV, Need, ID first issued by processing center XY, charitable institution acronym SOSV.]

ID:930215:930101:79900150DUDXYDECU:Decisions Unlimited:
711 Analysis Plaza;Rocket Science City:777-7777:Lucky Eddie, Ph.D.::
[Field 4: Delegatee organization (first digit a 7), organization code = 99, delegatee organization # = 150, initials DU, Delegatee, ID first issued by processing center XY, (unique) acronym DECU. Fields 2-4: name, address, telephone(s). Field 5: contact person.]

ID:930215:930101:90300000LRGXYLEVR:Leviathan Republic:
1 Memorial Drive;Capital City:111-1111:John Q. Appointee, MoF::
[Field 4: Government (first digit a 9), nation-state # = 03, regional government # = 00 (i.e., not applicable-"na"), local government # = 000 (i.e., 'not applicable-"na") (note that transactions for a local government would have appropriate index numbers for both regional and local government), initials LR, Government, ID first issued by processing center XY, (unique) acronym LEVR.]

Note:

For some purposes (e.g., when an enterprise specifies its employees, and citizen records are automatically generated for incorporation into each employee's individual transaction block) the fields after the ID code can be omitted.

JOIN (JN J)

Syntax:

JOIN:date entered:as of date:enterprise acronym:
capacity (Ceo, Board, Officer, Employee [non-officer]):
stock compensation (denominated in local currency, # of shares, or % of outstanding shares)::

This transaction indicates that an individual joined an enterprise as of the specified date, in the indicated capacity. This record is originally entered by the enterprise, which submits a series of such JOIN records, but with the "enterprise acronym" field replaced by an "individual code" field. These enterprise JOIN transactions are then used to generate individual JOIN transactions. This generation will take place late in the processing cycle, after all enterprise data has been centralized, to inhibit intentional or unintentional errors. (For example, instances where an individual is reported to be affiliated with multiple enterprises are reported. This will also help in the review of Privatization Business Plans to flag potential overlap of enterprises.)

Examples:

ID:930215:930101:421145000SIEXYSTLI:Steel Inc.::
JOIN:':':19431120JRMXYABCD:C:.01%::
JOIN:':':19500125PJMXYZYXW:O:100S::
JOIN:':930701:19501205MSMXYFGHI:E:500::
[This sequence of transactions is entered by enterprise STLI, and results in the following individual JOIN transactions being generated.]

ID:930215:930101:19431120JRMXYABCD::
JOIN:':':STLI:C:.01%::
[As of January 1, 1993, this individual joined enterprise STLI as its CEO, with annual stock compensation equal to .01% of outstanding shares.]

ID:930215:930101:19500125PJMXYZYXW::
JOIN:':':STLI:O:100S::
[This individual joined as an Officer, with annual stock compensation equal to 100 shares.]

ID:930215:930701:19501205MSMXYFGHI::
JOIN:':':STLI:E:500::
[MS joined STLI as an employee (non-officer) halfway through the year, with stock compensation of 500 (local currency) per annum. Therefore, 250 units of local currency will be used to purchase shares of STLI for his account.]

LEAVE (LV L)

Syntax:

LEAVE:date entered:as of date:enterprise acronym::

This transaction specifies that an individual has left an enterprise on the given date. Therefore, stock compensation is terminated as of that date. Like the JOIN transaction, individual LEAVE transactions are generated from LEAVE transactions submitted by the enterprise.

Example:

LEAVE:930901:930815:STLI::
[This individual left enterprise STLI on August 15, 1993, up to which point any applicable stock compensation will be prorated.]

NOTE (N)

Syntax:

NOTE:date entered:as of date:non-executing commentary::

NOTE provides the ability to introduce commentary.

Example:

NOTE:':':Previous record was cancelled due to apparently incorrect data in the last field. Ms. Q. X. Data-checker.::

OVERSIGHT (OVER O)

Syntax:

OVER:date entered:as of date:enterprise acronym:
privatisation date:demonopolisation date:confiscation percentage::

Only the Privatization Board (or other authorized government agency) can submit this transaction, which establishes the privatisation and demonopolisation dates of an enterprise. Achievement of privatization is a prerequisite for accrual of compensation stock in privatised large state enterprises. Achievement of demonopolisation is a prerequisite for recipients of such compensation stock (whether as a member of the board, officer, or non-officer employee) to transfer (away) any stock in that enterprise (even if some of it had been purchased, and even if the individual has already left the enterprise).

The "confiscation percentage" is equal to the Privatization Board's estimate of the percentage of share value at demonopolization attributable to monopoly rent arising subsequent to privatisation. The "confiscation percentage" of compensation stock earned previous to certification of demonopolization is automatically transferred to the government's social welfare account. However, if certification of demonopolization is achieved (on an "as of" basis) within a safe harbor interval (e.g., 1 to 2 years), then the "confiscation percentage" must be set to 0.

The net result is to strongly encourage those individuals entitled to compensation stock in an enterprise to achieve its demonopolisation as rapidly as possible.

Examples:

OVER:930315:930315:STLI:930601::
[The Privatisation Board approved the Privatization Business Plan of enterprise STLI, and set the effective date of privatization to be June 1, 1993, perhaps to coincide with an entire cohort of enterprises being privatized. Note the absence of the inapplicable trailing fields.]

OVER:940601:940601:STLI:930601:940515::
[The Privatisation Board certifies the demonopolisation of STLI on May 15, 1994.]

Notes:

1. This transaction applies only to privatized large state enterprises. Authentication of other enterprises allowed onto the Privatize!$^{TM}$ system is the re-

sponsibility of the agency with authority over operation of module EGEN which generates the Enterprise File (EPRISE) (see Appendices 1 and 2).

2. It remains possible for key executives to purchase, before demonopolization is achieved, stock in their enterprise at prices which do not sufficiently anticipate subsequent monopoly rent. Therefore, any request for certification of demonopolization submitted after the safe harbor interval should include the transaction blocks of members of the board and officers of an enterprise. The Demonopolization Board could then condition certification of demonopolization upon confiscation of any appropriate percentage of even non-compensation (i.e., purchased) stock in the enterprise. This authority would presumably only be invoked in cases of significant abuse.

PERCENTAGE (PER P)

Syntax:

PER:':':minimum compensation (% of assets):minimum compensation (% of earnings): maximum amount of assets under discretion:% of assets selected on the basis of compensation by earnings::

PERCENTAGE enables a delegatee-organisation to specify its minimum acceptable compensation, the maximum amount of assets under its discretion and the percentage to be selected on the basis of compensation by earnings (with the rest selected on the basis of compensation by assets).

Examples:

PER:':':.5:5:250,000,000:77::
[This delegatee-organization requires that its compensation be at least .5% of assets or 5% of earnings; it will not accept discretion over total assets exceeding 250,000,000 (in local currency); and it chooses to have 77% of the delegated assets under its discretion selected on the basis of earnings.]

Notes:

1. Statutory and decretal constraints remain, such as maximum compensation percentages and maximum amount of delegated assets subject to discretion by any single delegatee-organisation.

2. Regulatory constraints also remain, such as any stricter limit on the maximum amount of delegated assets on this particular delegatee-organization imposed by its oversight agency.

3. There is no guarantee that there will be any offers to delegate which exceed the minimum compensation percentages. On the other hand, the maximum amount of assets may be reached with all offers higher than those minima.

4. Default values are established by law or decree, and are contained in INCLUDED MODULE - GLOPARMS (see Appendix 2).

5. The PERCENTAGE record which DELCOMP posts at the end of the Delegatee Order File (DORF) does not update the Transaction Data Base (XDB), and so is unambiguously attributable to DELCOMP (rather than to the delegatee itself) by its context.

REINVEST (RNV R)

Syntax:

RNV:date entered:as of date:asset1:%:asset2:%:...:assetn:%::

REINVEST specifies how the earnings of a portfolio are to be invested.

Example:

RNV:930215:931231:ESTLI:50%:SMU:20%:
DLEVR;96:5%:DLEVR;97:5%:DLEVR;98:5%:FCUS:15%::
[Invest 50% of portfolio earnings in enterprise STLI, 20% in SMUs, 5% in debt to LEVR maturing in each of 1996, 1997 and 1998, and 15% in U.S. dollars.]

Note:

Dates are used only to determine the most recent, and therefore controlling, REINVEST transactions.

SECURITY (SEC S)

Syntax:

SECURITY:date entered:as of date:

SECURITY transactions are entered in pairs. The transactions which they bracket apply to the "social security" portion of a portfolio, for which valid assets are limited to Stock Market Units (SMUs), government debt (DXXXX or DIXXXX specifying a governmental entity) or lifetime annuities (PAYOUT).

Examples:

SECURITY:921115:930101::
ACQ:':':SMU:S:LSER:S:.25::
SECURITY:':'::
[This "initialization transaction" exchanges .25 Large State Enterprise Rights (see Appendix 4: LSER) for SMUs (Stock Market Units) at the Statutorily nominal price of 1 SMU per LSER. Since it is bracketed by SECURITY transactions, the SMUs are contained in the "social security" portion of the portfolio. If in addition there is a freely transferable SMU allocation of 1 per citizen, this corresponds to a statutory set-aside of 20% into the restricted "social security" portion of a citizen's portfolio.]

SECURITY:':'::
ACQ:':':DILEVR;00-10:2.5
ACQ:':':PAYOUT;FNBR;60;D;N;M:5%:SMU:0:.1::
SECURITY:':'::
[Exchange .1 SMU of the "social security" portfolio at prevailing prices for indexed debt in government LEVR, attempting to obtain the highest yield within the maturity interval 2000 to 2010, but no less than 2.5% above inflation. Exchange another .1 SMU for a lifetime annuity starting at age 60 without right of survivorship, payable monthly by FNBR, if the implicit interest rate is at least 5%.]

Notes:

1. The SECURITY transaction is only valid for citizens (whose first digit in the ID code is a 1 or 2) or for the government.

2. Matching SECURITY transactions, and the transactions which they bracket, are considered a sub-block and kept intact throughout the merge-sorting of the Transaction Data Base (XDB).

3. Initially, TRANSFER and DELEGATE commands are invalid within a SECURITY sub-block, so that the government maintains custody over, and the individual citizen maintains investment authority over, the "social security" portfolio.

4. In cases of hardship justifying immediate distribution of part of the "social security" account, ACQUIRE transactions in exchange for "value received" (VAL) would be entered for a citizen's portfolio directly by the government welfare agency authenticating the situation and paying out the proceeds.

TRANSFER (XFER T)

Syntax:

TRANSFER:date entered:as of date:financial institution acronym:asset:amount::

TRANSFER directs that the specified amount of the indicated asset be transferred to the financial institution identified by "acronym." This transfer will take place at the completion of the processing cycle, via the Disposition File (see Appendix 2: PASS5, and Appendix 1: DF - Disposition File). While the TRANSFER asset amount can be expressed as a percentage of portfolio contents, PASS5 translates that to an absolute amount prior to writing the information to the Disposition File.

Examples:

XFER:':':MLPF:ESTLI:100%::
XFER:':':MLPF:SMU:50%::
[Transfer 100% of the portfolio stock of enterprise STLI, and 50% of the SMUs, to financial institution MLPF.]

XFER:':':DBNK:FCDM:100%::
[Transfer 100% of the portfolio deutsche marks to financial institution DBNK.]

Notes:

1. The financial institutions must be authorized to act as custodians of that type of asset (see Appendix 2: Included Module - FINOK).

2. When alternative, non-governmental financial institutions become authorised to act as custodians of entire portfolios, transactions of the form:

XFER:':':MLPF:ALL:100%::

would become valid. This will provide a vehicle whereby particularly large or active portfolios could be removed from the general processing system, reducing its overhead and enabling investment transactions more frequent than the general investment cycle.

WHEN (W)

Syntax:

WHEN:entered date:as of date::

WHEN sets the entered date and the "as of" date.

Example:

REINVEST:930215:930215:ALL:50%:
SMU:20%:DLEVR;96:5%:DLEVR;97:5%:DLEVR;98:5%:FCUS:15%:FCJY:10%::

CXL:940125:940125:PREV::
REINVEST:940125:931231:ALL:50%:
SMU:20%:DLEVR;96:5%:DLEVR;97:5%:DLEVR;98:5%:FCUS:5%::
NOTE:':':Reinvest record replaced because more than 100% allocated, so deleted from last field to reach 100%.::
WHEN:930215:930215::
[In this sequence, the original REINVEST record was erroneous. During the processing cycle, it is canceled (rather than merely dropped, in order to maintain a complete audit trail) and replaced, and the date is then reset with the WHEN command so as not to affect subsequent transactions.]

## Appendix 4: Asset Categories

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86 Virtual Assets:

86 DR Donation Rights

87 LSER Large State Enterprise Rights

88 SSER Small State Enterprise Rights

89 TR Testamentary Rights

91 VAL Value Received

ALL: All Assets

This asset category corresponds to the composite of all the assets in a portfolio. Note that this is an invalid asset to bid for (as "asset1" in an ACQUIRE record), and must be used with a price of "0" (i.e., offering the portfolio assets at the market prices to be determined) when used as "asset2" in an ACQUIRE record.

DXXXX: Debt

Syntax:

:DXXXX;YY;rr:

Debt is a portfolio asset of the lender (and corresponding liability of the borrower). Acronym XXXX specifies the borrowing entity, and is restricted to governmental entities, financial institutions and enterprises.

The year of maturity is specified by YY, with "D" corresponding to a demand loan. A demand loan would be appropriate if the lender deposited cash with the expectation of purchasing other financial instruments at the next investment cycle. At maturity, the proceeds are invested in liquid debt of the state (e.g., DLEVR;D) at prevailing interest rates. The simple annual interest rate of the debt instrument is specified by rr, which is an optional subfield when entering transactions unless needed to resolve ambiguities between debt instruments in a portfolio.

Offers to lend in an ACQ transaction must be matched up with a corresponding offer to borrow in order to be consummated. Matching requires identical acronyms and either identical or overlapping maturities.

During the second processing pass through the final sorted Transaction Data Base (XDB), PASS2 approximates the amount of offers to lend by acronym, maturity and price, and a (brief) opportunity is made available to potential borrower-entities to update any offers to borrow with appropriate ACQ transactions. This enhances debt management capabilities. Module PASS5 calculates the debt interest rate rr from the bids and offers and posts it to the updated XDB.

Prices are specified as the simple annual interest rate of the debt.

Example:

:DLEVR;01:
[Debt of LEVR to mature in the year 2001.]

Notes:

1. The year of maturity can be selected according to the personal circumstances of the lender. This may increase the attractiveness of debt and therefore the amount invested in it. However, a borrower can choose to manage its debt by

bidding only for specified maturities (e.g., 5, 10 and 20 years), presumably with appropriate public notice.

2. In the future, it may be desirable to allow specification of maturity intervals, within which the processing system attempts to maximise the yield, to smooth out the yield curve. Since a steep yield curve (with yields quickly increasing as maturities lengthen) is often associated with fiscal stimulus and inflation, and an inverted yield curve (with short-term yields above long-term yields) is often associated with tight money triggering a recession, a tendency toward a smoother yield curve may not only facilitate debt management but also economic stabilization.

DIXXXX: Indexed Debt

Syntax:

:DIXXXX;YY;rr:

The indexed debt instrument DIXXXX is exactly analogous in all respects to the un-indexed debt instrument DXXXX, with the exception that interest rates are expressed in "real" terms (i.e., after inflation as estimated by an index specified by statute or decree).

Note:

If a financial institution accepts indexed deposits, account holders have an inflation hedge. If the financial institution in turn lends those funds to enterprises as indexed debt with an interest rate markup, it is also hedged against inflation. The enterprises would then presumably conduct their operations in a way to cope with prevailing inflation.

**EXXXX: Enterprise Stock**

**Enterprise stock represents shares in enterprise XXXX. For privatised large state enterprises, shares are tradeable only after approval of the corresponding privatisation business plan (PBP), and the sale of compensation stock is prohibited until after certification of achievement of the demonopolisation goals contained in the PBP. (See the OVERSIGHT command in Appendix 3.)**

**Prices are specified in local currency per share.**

FCXX: Foreign Currency

This asset represents foreign currency for country XX, e.g., U.S. dollars (FCUS) or deutsche marks (FCDM). Other currencies can be readily added.

The foreign currency is expected to be held in a liquid account yielding an appropriate rate of interest.

The price is specified as local currency per foreign currency.

PAYOUT: Cash or Annuity

Syntax:

:PAYOUT;government or financial institution acronym;
begin;end;survive;frequency;
implicit interest rate;actuarial table #;periodic payment:

PAYOUT designates a generalized annuity.

One option is cash, available to the portfolio owner (after the processing cycle is completed) from the financial institution specified in subfield 2. Cash is specified by setting the begin and end times equal, and on or before the "as of" date of the processing cycle. However, this would presumably be an inappropriate option if demand deposits (DXXXX or DIXXXX) were available through an acceptable financial institution.

The alternative is a stream of payments over an interval with a specified beginning and end, an "annuity." The beginning can be specified as a date (year, month and date, in the form yymmdd) or an age in years(in the form XX). The end can be specified as a date, an age or death (specified by D). If the end is specified as a date or an age, the portfolio owner can also specify whether the payments should continue upon his or her death. The default of payment termination upon death, with higher payout amounts, can be overriden with an S in the "survive" subfield (otherwise the subfield is left empty or filled with N). Unless the portfolio owner is an individual, begin and end dates cannot be ages and an S is used irrespective of the entry in the "survive" subfield. Payment frequency can be specified as annual (A), quarterly (Q), monthly (M), or weekly (W).

The annuity payment amounts are calculated by module "ACTUARY", taking into account standardised survival tables. If a government is acting as principal, actuarial shortfalls can be covered off-budget by the SMUs or enterprise stock kept in its social welfare account; actuarial windfalls can likewise be credited to that account. Financial institutions acting as principals could perhaps contract with the government for actuarial insurance backed by that same account also.

The price of an annuity is specified as the implicit rate of return assuming a particular actuarial table. Module PASS5 determines the execution price of a transaction from all bids and offers, and then posts it, the identifier of the corresponding actuarial table and the periodic payment amount as the last three subfields of the PAYOUT asset (which are unneeded if unnecessary to resolve ambiguity) to the updated Transaction Data Base (XDB).

Note:

The annuity can be considered to be indexed to the inflation rate (see discussion under asset DIXXXX), or an additional instrument PAYOUT1 can be created to serve that purpose. If the annuity is indexed, then the implicit rate is the "real" return (with inflation factored out). In this case, the financial institutions make available payment streams which vary with future inflation.

SMU: Stock Market Unit

Stock Market Units (SMUs) are created by legislation or decree. A SMU incorporates one share of each large state enterprise privatized by the end of 199X (e.g., 1995), where X is specified in the legislation or decree. "Privatization" occurs upon the "privatization date" specified in an approved privatization business plan submitted by an enterprise.

Note that stock ownership rights to SMUs (see Virtual Asset: Large State Enterprise Rights) which incorporate rights to shares in enterprises privatized by a future date certain are created immediately by the legislation or decree.

Prices are specified in local currency per SMU.

SMU2: 2d Tranche of SMUs

SMU2s are analogous to SMUs, and are also created by legislation or decree. A SMU2 incorporates one share of each large state enterprise privatized between 199X and 199Y, where X corresponds to the cut-off for inclusion of enterprise stock in a SMU, and Y is the corresponding SMU2 cut-off. X and Y are established by legislation or decree. For example, SMUs could comprise one share of each large state enterprise privatized by the end of 1995 (about a three year period), while SMU2s could comprise one share of each large state enterprise privatized from the beginning of 1996 to the end of the year 2000 (a five year period).

Prices are specified in local currency per SMU2.

Notes:

1. To encourage early privatization, executive and board compensation set by statute or decree can be more attractive for earlier privatization.

2. To prevent useless speculation, an initial moratorium (e.g., one year) on trading SMU2s could be imposed. During such an interval, there would likely be little reliable information with which to value such a deferred asset, and it is unclear what near-term utility enhanced price discovery for SMU2s would provide.

VOUCHER: Privatisation Voucher

The privatization voucher is authorized by legislation or decree. In the context of appropriate enabling regulations, it is possible to interpret it as the right to one citizen's share of the publicly distributable capital of each large state enterprise privatized by the end of 199X, where X is specified in the legislation or decree. It is the physical analogue in script form of the Stock Market Unit (SMU) asset on the Privatise!™ system.

A typical transaction redeeming a physical voucher for a Stock Market Unit could be:

ACQ:921201:931231:SMU:S:VOUCHER:S:1::
ACQ:':931231:ESTLI:2000:SMU:0:.5::
[The first transaction, entered on December 1, 1992 and taking effect as of December 31, 1993, exchanges one privatization voucher for one Stock Market Unit (SMU) at the statutorily nominal price of 1 SMU per VOUCHER. The second transaction, entered on the same date, places a bid for shares in enterprise STLI at a price not to exceed 2000 (local currency), using the proceeds of half the Stock Market Unit liquidated at the market price effective on December 31, 1993.]

Virtual Asset: Donation Rights (DR)

Donation rights are "transferred" to a donor in exchange for a gift, and are perhaps better described as a "donation privilege."

Cross-prices are a statutorily nominal 1 Whatever per DR.

Example:

ID:921015:921015:19601120JSMXYJKLM::
ACQ:':':DR:S:SMU:S:.1::
ID:':':60100001CVNXYSOSV::
ACQ:':':SMU:S:DR:S:.1::
[The individual specified by the first ID record has donated .1 SMU (at the Statutorily nominal price of 1 SMU per DR) to the charitable institution specified by the subsequent ID record. A donation must be entered as a contiguous matched pair including donor and donee. Module XACT will sort the transactions for eventual incorporation into transaction blocks containing the complete set of transactions for each ID. However, in the case of a donation, XACT will also generate "documentation" notes. A note containing a clone of the donee ID record will be inserted immediately following the donor's ACQ record. An analogous note containing a clone of the donor ID record will be inserted immediately following the donee's ACQ record.]

Virtual Asset: Large State Enterprise Rights (LSER)

Large state enterprise rights are created by statute or decree, for instance when Stock Market Units (SMUs or SMU2s) are brought into being.

Cross-prices are a statutorily nominal 1 Whatever per LSER.

A typical initialisation transaction for a citizen would be:

ACQ:921201:921231:SMU:S:LSER:S:1::
[This transaction, entered December 1, 1992 and taking effect as of December 31, 1992, would exchange 1 LSER (Large State Enterprise Right) for SMUs (Stock Market Units) at the Statutorily nominal price of 1 SMU per LSER. Note the implicit transfer, from the state as trustee or from the government as custodian, of the Large State Enterprise Right.]

Virtual Asset: Small State Enterprise Rights (SSER)

These rights in small state enterprises such as shops or small businesses are granted an individual or enterprise in return for some exchange such as a combination of cash, a mortgage or a contractual commitment to maintain a certain size workforce with specified salaries and benefits. Typically, these rights would be auctioned by a local governmental entity, which could be entitled by statute to a percentage of the bid and so would be motivated to devise a strategy to maximize its combined value. An individual could also bid a portion of the SMUs (Stock Market Units) in his or her portfolio.

Cross-prices are a statutorily nominal 1 Whatever per SSER.

For example, assuming SMUs are legislated into being on October 1, 1992, even before they are "operationalized" an individual's current interest could be transferred as part of a successful bid for a small state enterprise as follows:

ID:921015:921015:19601120JSMXYJKLM::
ACQ:921015:921015:SSER:S:SMU:S:.5::
ID:':':90304005LGGXYLOCG:Local Government::
ACQ:':':SMU:S:SSER:S:.15::
ID:':':90304000RGGXYREGG:Regional Government::
ACQ:':':SMU:S:SSER:S:.1::
ID:':':90300000LRGXYLEVR:Leviathan Republic::
ACQ:':':SMU:S:SSER:S:.25::
[On October 15, 1992, an individual (specified in the initial ID record) transferred .5 of his SMUs as part of a successful bid for rights in a small state enterprise. These SMUs are transferred 30% to the local government arranging the auction, 20% to the regional government and 50% to the state. Note that all transactions occur at the Statutorily nominal price of 1 SMU per SSER.]

Virtual Asset: Testamentary Rights (TR)

These are transferred from a legatee "to" a deceased individual in exchange for a bequest, as certified and entered by appropriate local authorities after processing any will or conducting any "probate."

Cross-prices are a statutorily nominal 1 Whatever per TR.

Example:

ID:930815:930715:19431120JRMXYABCD::
ACQ:':':TR:S:ESTLI:S:1000::
ID:':':19630704MRMXYBCDE::
ACQ:':':ESTLI:S:TR:S:1000::
NOTE:Bequest of 1000 shares of STLI from JR to MR.::

ID:':':19431120JRMXYABCD::
ACQ:':':TR:S:ALL:S:50%::
ID:':':19460630ERFXYCDEF::
ACQ:':':PAYOUT;FNBR;940101;D;N;M:S:TR:S:50%::
NOTE:50% of the portfolio balance is to be liquidated on behalf of ER to purchase a lifetime annuity through FNBR payable monthly without right of survivorship.::

ID:':':19431120JRMXYABCD::
ACQ:':':TR:S:ALL:S:30%::
ID:':':19830210LRFXYDEFG::
ACQ:':':PAYOUT;FNBR;940101;030101;S;A:S:TR:S:30%::
NOTE:Another 30% is to be liquidated on behalf of LR to purchase a 9 year annuity from FNBR payable annually, with a right of survivorship.::

ID:':':19431120JRMXYABCD::
ACQ:':':TR:S:ALL:S:20%::
ID:':':60100001CVNXYSOSV::
ACQ:':':DFNBR;D:S:TR:S:20%::
NOTE:The remaining 20% is liquidated on behalf of charitable institution SOSV, and transferred to it as liquid assets deposited in FNBR.::

Notes:

1. Bequests will generally be liquidated and then used to purchase assets such as PAYOUT or DXXXX;D (to avoid the significant difficulty of transferring percentages of an entire portfolio intact). The exception is when fixed (non-

percentage) amounts of specific assets (such as enterprise stock, in order to preserve control) are transferred. However, the nature of the processing cycle and serial storage media make it difficult to verify that the asset actually existed in the specified quantity in the portfolio of the deceased. Therefore, the legatee may assume any risk associated with entering a transaction involving that asset which must be subsequently "reversed.")

2. As in the treatment of Donation Rights, appropriate "documentation" notes will be generated prior to sorting the transactions by ID.

Virtual Asset: Value Received (VAL)

This asset is a placeholder representing value received outside the Privatise!™ system.

Cross-prices are a statutorily nominal 1 Whatever per VAL.

Example:

ID:':':ID code of new stock subscriber # 1::
ACQ:':':ENEW:S:VAL:S:1000::
ID:':':ID code of new stock subscriber # 2::
ACQ:':':ENEW:S:VAL:S:500::
ID:':':ID code of new stock subscriber # 3::
ACQ:':':ENEW:S:VAL:S:20::
[This series of transactions, only entered by enterprise NEW itself (as authenticated by an appropriate government agency such as the Privatisation Board) transfers a total of 1,520 shares of stock to three subscribers.]

Note:

Acquiring any asset in the Privatise!™ system in exchange for value received outside it requires satisfactory documentation and authentication.

Appendix 5: Individual Transaction Entry Form

ID Name: _____
address: _____
telephone: _____

supplemental
name: _____
code: _____

Portfolio account: ☐ Regular
☐ Social Security

DELEGATE _____ ☐ Investment
delegatee-acronym ☐ Voting

_____ ☐ Earnings
% compensation ☐ Assets

ELSE:ACQ _____ _____ _____ _____ _____
bid-for asset bid price offered asset offer price amount

REINVEST _____ ___ _____ ___ _____ ___
asset % asset % asset %

TRANSFER _____ _____ _____
financial institution asset amount

| | | | | | |
|---|---|---|---|---|---|
| ACQUIRE | bid-for asset | bid price | offered asset | offer price | amount |
| ELSE:ACQ | bid-for asset | bid price | offered asset | offer price | amount |

| | | | | | |
|---|---|---|---|---|---|
| ACQUIRE | bid-for asset | bid price | offered asset | offer price | amount |
| ELSE:ACQ | bid-for asset | bid price | offered asset | offer price | amount |

| | | | | | |
|---|---|---|---|---|---|
| ACQUIRE | bid-for asset | bid price | offered asset | offer price | amount |
| ELSE:ACQ | bid-for asset | bid price | offered asset | offer price | amount |

| | | | | | |
|---|---|---|---|---|---|
| ACQUIRE | bid-for asset | bid price | offered asset | offer price | amount |
| ELSE:ACQ | bid-for asset | bid price | offered asset | offer price | amount |

Portfolio Owner date

official #1 title date

official #2 title date

## Appendix 6: Report Formats

### Disposition Report (generated by DISPOSE)

Custodial financial institution name
address
phone
supplementary name
(ID code)

Recipient #1 name
address
phone
supplementary name
(ID code)
asset1 amount1
...
assetn amountn

...

Recipient #N name
address
phone
supplementary name
(ID code)
asset1 amount1
...
assetn amountn

Lending Report (generated by PASS2)

Potential borrower name
address
phone
supplementary name
(ID code)

Approximate amount of loans offered at specified maturities and interest rates:

Maturity #1: Year =
Demand amount
1% amount
...
X% amount

...

Maturity #N: Year =
Demand amount
1% amount
...
X% amount

Warning Report (generated by AUCTION)

Potential over-transferor #1
ID record (short form)
.or.
Transaction block (long form)
Apparent amount of SMU transfers

...

Potential over-transferor #N
ID record (short form)
.or.
Transaction block (long form)
Apparent amount of SMU transfers

Appendix 7: Transaction Errors

ELSE contains transactions other than ACQUIRE.

ELSE following ACQUIRE has "same" asset pairs. For the purpose of this comparison, all debt of any particular entity is considered to be the "same" irrespective of maturity.

ELSE follows transaction other than DELEGATE or ACQUIRE.

Invalid asset in this context.
Debt instrument cannot be used by non-issuer as "asset2" in ACQUIRE transaction.

Invalid command for this type of entity:
1. BANK can only be entered by an enterprise.
2. DELEGATE cannot be entered by a delegatee-organization except for proprietary assets.
3. DIVIDEND can only be entered by an enterprise.
4. FILTER can only be entered by a delegatee-organization.
5. GRADE can only be entered by a financial institution coded as an evaluator-organization.
6. JOIN and LEAVE can only be originally entered by an enterprise, though they can be validly posted to an individual transaction block.
7. OVERSIGHT can only be entered by the appropriate government agency (e.g., Privatization Board).
8. PERCENTAGE can only be entered by delegatee-organizations.
9. SECURITY can only be entered by a citizen, or by the government.

Invalid command in this context.
1. TRANSFER and DELEGATE commands invalid within SECURITY sub-block.

Unmatched FILTER command.

Unmatched SECURITY command.

# PRIVATIZATION PLANNER(tm)

## ADAPTIVE KNOWLEDGE BASE

Draft of October 31, 1993

APPENDIX C

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# Privatization Planner(tm)

## Adaptive Knowledge Base

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Section 1. Introduction

Privatization Planner(tm) implements a truly adaptive knowledge base. Users can review, evaluate and contribute to the structured information. Their contributions are in turn evaluated by other users. Such evaluations determine which portions of the knowledge base survive into future generations. This software technology is a tool which transforms the knowledge of a user community into a dynamically growing and evolving knowledge base.

Privatization Planner(tm) also incorporates a process to effectively access knowledge base entries. For example, assume that one node of the knowledge base is a bibliography containing thousands of books or articles as subtopics. The first access technique is via hierarchical topics, distinguished by allowing pages of information to be associated with each topic mode and not just the terminal nodes. Once the bibliography topic is selected, the challenge remains how to effectively access the thousands of subtopics.

A very large number of (for example) bibliographic subtopics can be effectively accessed by (see the Order command):

1. Finding all works posted after a given date;

2. Finding all works matching a given set of keywords;

3. Selecting only those works previously evaluated within a certain range by a specified user or users;

4. Selecting only those works whose actual or estimated evaluation by the user himself or herself is within a certain range;

5. A combination of the above choices.

The selected subtopics can also be sorted by date, other user(s) evaluations, or actual/estimated evaluations of the user himself or herself.

Privatization Planner(tm) can be implemented on diskette or other physically transported media, or by an electronic network. In either case, the implementation can be hierarchical, with nodes of computers collecting contributions and evaluations which are periodically aggregated by the computer at the parent node. The preferred implementation is a combination of both approaches, with physical media periodically integrated into an electronic network knowledge base.

Section 2. Operation of Privatization Planner(tm)

A. From the Perspective of an Individual User

Access to the hierarchical knowledge base is provided either by an electronic network or by physical media such as diskettes or CD-Roms. The user first copies the knowledge base onto a hard disk when available (for physical media rather than electronic network), and types "ndn". The system then displays a welcome screen, and prompts as necessary:

Enter disk drive for ndn file [e.g., 'c:']:

Enter directory of ndn file [e.g., 'ndn']:

At this point, the program displays the top of the hierarchical "table of contents" in "page mode", and awaits user commands.

Upon completion of the user's review, the knowledge base will include his or her evaluations and proposed changes. The user then copies the knowledge base back to diskette and forwards it to the system coordinator for compilation and analysis.

B. From the Perspective of the System Coordinator

The job of the system coordinator can be parsed into a series of tasks:

i) The current version of the executable program file and the hierarchical data base is made available to a select set of interested and knowledgeable users.

ii) The users explore those portions of the data base which are of relevance and interest to them. In the process, they have the ability to enter their opinions for the values of variables, to evaluate and comment on topic layouts and page contents, and to propose additions, replacements or deletions to topics and/or pages.

iii) For physical media users, those media are returned to the system coordinator, who aggregates them by copying directories and files onto a disk partition, and then onto a composite diskette or diskettes. The composite diskette(s) are then redistributed for evaluation and comment. Note that if necessitated by the quantity of information, different subsets of the composite data base can be distributed to different users based on their expressions of interest for this evaluation phase.

A set of diskettes is then prepared for each contributor, including his or her own topic setup and page contents, and all the feedback it generated (evaluations, comments and entries for values of variables). This contributor is then given an opportunity to make modifications based on that feedback, and return a new version to the system coordinator.

iv) The system coordinator again copies directories and files onto a disk partition, and then runs the following modules when available:
-- "vacuum", which cleans out all unused files and directories;
-- "evaluate", an optional step which tags the nodes of the hierarchical data base with values calculated according to the scoring parameters and algorithms then in effect;
-- "select", which copies to diskette(s) several versions: the optimal (default) version of the hierarchical knowledge base, contributions from the H highest-evaluated users, and contributions from other users as a probabilistic function of their evaluations and the user's interest in those topics.

v) The selected versions are then distributed at the start of a new "generation", corresponding to step (i).

vi) The security system for diskette (or other physical medium) amounts to transmission to and from known users. The software supports the ability for each distributee to circulate the original diskette or a copy of it among additional users (who would have the same ability).
However, since all the users of a given physical diskette would have the ability to alter or override each other's responses, this should be limited to knowledgeable and interested persons in a position of privity to the original distributee.

In addition, where the system is used in a "closed end" automatic optimization mode, where the evaluations of a known set of users determine the versions preserved into subsequent distribution cycles, if the distributee includes additional users then a single "optimal" representation of the distributee's entire group can be formulated.

For implementation on an electronic network, physical distribution of diskettes is unnecessary and standard security procedures for access and login would apply. In addition, an on-line system can make available to each user the entire knowledge base and all proposed contributions.

3. Description of User Commands

The adaptive knowledge base is organized into topics and pages, with two corresponding modes of operation. In topic mode the hierarchical organization of topics covered in the system can be displayed and altered. It can be thought of as an interactive, hierarchical table of contents. In page mode the contents of pages of information relevant to the current topic within the hierarchical knowledge base can be displayed and altered. The topic can be thought of as part of the table of contents, while the pages are the actual information addressed by that table of contents.

A. Command Summary

A Add a topic or page (e.g., A2 adds before second one).
B Back to previous screen of topics, if can't fit on one screen.
C Customize user's setup.
D Delete a topic or page (e.g., D2 deletes second one).
E Evaluate a topic or page (prompts for 1-5 rating and comment).
F Forward a screen of topics (when can't fit all on one screen).
G Goto a previously Labelled topic (e.g., Gbiblio).
H Help explains available commands.
I Interest level in topic(I1: no interest, I5: most interested).
J eJect page from laser printer.
K Keyword definition or invocation.
L Label the current topic (e.g., Lbiblio).
M Map display of current region in data base.
N Name the current topic differently.
O Order the current subtopics (i.e., filter and sort).
P Page. Switch to Page mode, or display Page X (e.g., P2).
Q Quit the knowledge base.
R Replace topic or page (e.g., R2).
S Simulate the Privatize!(tm) computerized marketplace.
T Topic. Switch to topic mode, or display topic (e.g., T2).
U User. Topic/page version in topic mode. Values in page mode.
V Values. Entry of user-specified values embedded in pages.
W Write a message to a specific user or set of users.
X eXit Customize, Help, Map, Order, Simulate & Write commands.

B. Documentation of Commands

Add
Syntax: A or Axx
where xx is between 0 and the number of topics or pages available at this level in the hierarchy.

This command allows a user to add a topic or page at the current level in the hierarchy.

A appends a new topic or page after existing topics.

Axx adds a new topic or page before number xx, except "A0" is equivalent to "A".

After creating a new topic, the user is prompted to enter its name.

Error condition:

1. If xx specifies an unavailable topic or page, the user is notified and prompted to try again.

2. While one user may view another user's topic organization or page contents, modification of them is not allowed.

Back (and Forward)
Syntax: B or Bxxxx; F or Fxxxx

If there is a large number of subtopics at a given node, the Back and Forward commands allow a user to effectively move through them.

For example, if the user is currently displaying the 500th to 520th subtopics, then issuing B will reposition the display to the 480th to 500th subtopics, and issuing B15 will reposition the display to the 15th to 35th subtopics.

If the user is currently displaying the 1200th to 1220th subtopics, issuing F will reposition the display to the 1220th to 1240th subtopics, and F2000 will reposition the display to the 2000th to 2020th subtopics.

Customize
Syntax: C

Customize allows a user to tailor system options to his or her preferences. It can be invoked immediately after login, or at any time subsequently from any directory topic and is terminated with the eXit command. System default options are overridden when the user enters new options. The user's choices are given effect for the current directory and all subdirectories, unless overridden by a later Customize command. A system parameter determines whether or not a Customize command for a given directory overrides previously entered Customize commands for its subdirectories.

Customize is implemented by copying into the current directory (if not previously copied) a template Customize subtopic of the System topic in the root directory, along with an explanatory page with embedded values for different options.

The specifiable options, which the system prompts for, include:

1. Identification of user contributions, which allows a user to remain public (the default), have the system select an alias by which his or her contributions can be accessed by others, or to become private to prevent access by others.

   For example, a user could choose to be private for a particular bibliography directory while developing and implementing a new keyword design, and then go public at a stage suitable for review by others.

2. Changing parameters "alpha", "beta" and "gamma" used to correlate user evaluations to evaluations entered by others. For a description of these parameters, see the documentation of the "Order" command.

3. For diskette (and other physical media) users (rather than electronic network users), specifying the type of medium (physical size and storage capacity) and the maximum number (e.g. of diskettes) to be sent. If the entire knowledge base and all proposed alternatives exceed this size, topics of no interest will be excluded and alternatives will be probabilistically included as a function of the user's interest level in particular topics (see the Interest command).

Delete
Syntax: Dxx
where xx is between 1 and the number of topics or pages available at this level.

This command allows a user to delete a topic or page in the current level in the hierarchy.

Error conditions:

1. If xx specifies an unavailable topic or page, the user is notified and prompted to try again.

2. While one user may view another user's topic organization or page contents, modification of it is not allowed.

Eval
Syntax: E

This command allows a user to evaluate the organization of the current topic or the contents of the current page, and to enter any comment on it.

The program first requests an evaluation as follows:

Please evaluate this topic/page (1 = very poor, 5 = very good):

The user has the option to enter a number from 1 to 5 (3 being neutral).

The program then requests any comment:

Please enter any comment on this topic:

The user then has the option to enter a comment, terminated by a "carriage return" or "enter" keystroke.

Error condition:

If the logged-on user is in his or her own setup, the Eval command is unavailable.

Forward
Syntax: F or Fxxxx

See the Back command for a description of the Forward command.

Goto
Syntax: Gxxxx

The Goto command repositions the user at the node in the hierarchical knowledge base previously "Labelled" as xxxxx. Therefore, it is convenient to Label topics which a user expects to return to repeatedly. Labels which begin with the character "." are considered temporary, in the sense that they can be overwritten without warning if the space is needed by new labels.

Labels are stored in the page(s) associated with the Label subtopic of the System topic in the root directory. The user can directly review the labels by selecting this Label subtopic and switching to page mode. This is how the user chooses which permanent label(s) to delete (by blanking the label field) when all slots are so used.

Error condition:

Attempting to define a new label after more than a predetermined number (initially set to 20) of permanent labels has been defined for a particular user.

Help
Syntax: H or Hx

The Help command provides on-line documentation of potential commands to the user. It is terminated by the eXit command.

H positions the user in the Help subtopic (of the System topic in the root directory), which displays a list of commands with brief descriptions which the user can select in order to inspect their page(s) of documentation.

Hx positions the user directly in the starting page of documentation for the subtopic associated with command x.

Interest
Syntax: I or Ix

The Interest command allows a user to specify his or her degree of interest in a topic and its subtopics. If the user enters I, the system prompts for the interest level x (1 indicating no interest, 5 the most interest).

For a diskette (or other physically transported medium) user, if the knowledge base size exceeds the maximum number of diskettes specified in the Customize command, then topics of no interest will be excluded and alternatives will be probabilistically included as a function of interest level in particular topics.

Keyword
Syntax: K (or Kxxxx, etc. see below) (from topic), or:
Kxxxxx=S Kxxxx=U Kxxxx=yyyy (from subtopic).

Keywords are generated or reviewed by entering the command K, which switches the user to the keyword topic in the current directory (copied from a template in the root directory when necessary). The keyword topic has an explanatory page with embedded values for different keywords, with keywords contributed by different users accessible via the User command just like other embedded values. Keywords defined in the root directory are accessible from any subdirectory, but keywords defined in a "keyed" directory other than the root apply only to immediate subdirectories.

The command Kxxxx (or Kxxxx=S?) from a topic will filter out all subtopics which do not match keyword xxxxx; the command Kxxxx- (or Kxxxx-S? or Kxxxx=U?) filters out all subtopics which do match keyword xxxxx; the command Kxxxx=yyyy? filters out all subtopics which do not match the yyyy value for keyword xxxxx; and the command Kxxxx-yyyy? filters out all subtopics which do match the yyyy value for keyword xxxxx. Successive keyword commands before moving up and out of the "keyed" directory successively filter out additional sets of subtopics.

The entry for each keyword consists of the keyword itself, a description of its meaning, and an optional boolean text specification. This specifies those words which must be present or not in the subtopic's name or page information in order for it to be accessed by the keyword. However, this "first approximation" of whether a particular subtopic matches a particular keyword can be overridden by entering:

Kxxxx=S or Kxxxx=U

from the particular subtopic itself, where xxxxx is the keyword, S is the flag for "Set" (meaning that subtopic will be accessed by the keyword), U is the flag for "Unset" (meaning that subtopic won't be accessed by the keyword). Kxxxx=yyyy is issued in a subtopic for multi-value keywords (e.g., Kcountry=US).

Note that the evaluation by other users of a Keyword page applies not to the page itself, but rather to the keywords proposed by the user whose embedded values (keywords) are displayed. The keywords are ranked (e.g., by summing the signed deviation of their evaluations from the average evaluation of 3), and the best are then presented as future defaults.

Label
Syntax: L or Lxxxx,description

The Label command works in conjunction with the Goto command. The Label command associates the location of the current node with the identifier xxxx, so that Gxxxx will return the user to that location.

If the user enters L, the system prompts for the label itself and a brief description of the node. It will then place that information in page(s) associated with the Label topic in the root directory.

Note: If the label xxxxx starts with a ".", it is "temporary" and subject to being overwritten without notice by new labels if there are no free slots. If the user requests a new label after all his or her slots are filled with "permanent" labels (not starting with "."), the system requests that the user inspect the pages of the Label topic and blank out unwanted labels to free up space.

Map
Syntax: M

The Map command displays the environment of a node by showing the ancestory of that topic up to the root directory. It is terminated with the eXit command.

Note: Subtopics are already listed when viewing a node in topic mode, and "siblings" can be seen by stepping up one level in the hierarchy with the T command.

Name
Syntax: N

The user is prompted to enter a new name for the current topic.

Note: to change the name of one of the subtopics of the current topic, that subtopic must first be invoked with the "Topic" command before using the "Name" command. While that subtopic could have been replaced without changing to it, its contents or "pages" of information would have been lost.

Error condition:

A user is not allowed to modify another user's topic.

Order
Syntax: O or Oxxxx

The Order command supports filtering and ranking a large number of subtopics, using entry dates, keywords, other users' evaluations, and estimates of the current user's own actual or estimated evaluations. It is terminated by the eXit command.

Order is implemented by a subtopic of the System topic in the root directory, with an explanation page with embedded values for different choices. Oxxxx (where xxxxx has been defined in a previous Order command) results in the system performing the specified filtering and sorting on the subtopics of the current directory. O (or Oxxxx where xxxxx has not been previously defined) results in the system displaying the appropriate page with instructions.

The first values to be entered are the label for this particular Order arrangement, and any optional description. Next, the user is prompted to enter the range of posting dates to consider (e.g., to check only previously-unreviewed subtopics). The next prompt is for those keywords which must all be matched. Alternatively, more general boolean logic could be used. The user then has the option to specify a range of evaluations in which he or she is interested, either by a specific user or all users averaged. Alternatively, specified subsets of users could be averaged. If the evaluation of a specific subtopic falls outside this range, it is filtered out. The next prompt is for the range of the user's own evaluation, either entered previously by the user or estimated from other users' entries by regression analysis (see section 5).

Note that a user will be motivated to enter some evaluations, since only by correlating those entries with other users' evaluations can the system respond with an estimated evaluation for subtopics which the user hasn't yet evaluated. This also allows the system to post cross-correlations (between this and other users' evaluations), which can then be displayed and used as a sort key when selecting which other user's version to inspect.

The user also has the option to multiple-sort the filtered subtopics by date of posting, evaluations by other users, his or her own actual or estimated evaluations, or by subfields of the subtopic name (such as title or author of works in a bibliography).

Note: Alternatively, boolean combinations of date, other evaluations and user evaluation conditions can be supported. E.g.: date within the last week; AND ranked at least superior by a specific other user OR else by all users averaged; OR estimated to be ranked above average for the user himself or herself; with sorting by the user's own actual/estimated evaluations.

Page
Syntax: P or Pxx

-- Topic mode --

In topic mode, the P command allows the user to switch from topic mode to page mode. (Topic mode is used to view or alter the organization or hierarchy of the information base, while page mode is used to view or alter the actual contents of a particular topic in the hierarchy.)

-- Page mode --

In page mode, the P command displays the next page, and Pxx displays page xx. The system notifies the user if the requested page doesn't exist.

Quit
Syntax: Q

This command gracefully terminates operation of the program, returning the user to the operating system.

Replace
Syntax: Rxx
where xx is between 1 and the number of topics or pages available at this level.

This command allows a user to replace a topic or page in the current level in the hierarchy.

Error conditions:

1. If xx specifies an unavailable topic or page, the user is notified and prompted to try again.

2. A user may view but not modify another user's topic organization or page contents.

Simulate
Syntax: Sxxxx

This command allows a privatization policy-maker or policy analyst to participate in a simulation of the algorithms and processes of the Privatize!(tm) computerized marketplace. It is terminated by the eXit command.

If Simulation xxxxx has not yet been initiated, the system asks whether the user wishes to initiate a new privatization marketplace simulation by performing the role of "government". If so, the user is repositioned into the Simulation xxxx Setup subtopic (whose "ancestory" is root\Utility\Simulation\Simulation xxxx). There, the user, as "government", specifies (as embedded values in the associated page(s)):

-- ids of eligible participants (or can allow anyone to participate) and optional "personae";
-- ids and descriptions of eligible delegatee-organizations (when the Delegate transaction is supported);
-- supported transactions and assets;
-- initial endowment of participants and any subsequent privatization transfers (or levies like fees or taxes);
-- default period of investment cycle (measured by time interval or cumulative number of submitted transactions);
-- general announcements to participants.

Note that the individual participants and the government can communicate directly via the Write command. For example, a user wishing to be approved as a delegatee-organization could submit descriptive qualifying data. If the "government" approved, that user would be added to the list of delegatee-organizations.

If a user-"government" has already set up Simulation xxxxx, then the user issuing the Sxxxx command is repositioned into the Simulation xxxxx topic and selects one of the following subtopics:

-- 1 Simulation xxxxx Setup
-- 2 Simulation xxxxx Price History
-- 3 Simulation xxxxx Portfolio History

The Setup subtopic displays the simulation framework as specified by the "government". The Price History subtopic has pages of information containing asset price data for each investment cycle, calculated by periodically executing the Privatize!(tm) simulation. The Portfolio History subtopic has pages containing portfolio and transaction data, by user, for each investment cycle. The transaction data is tagged as consummated or not by the periodic simulation. In each case, the data is represented by embedded values under the "government" id, except for the portfolio history data under each user's own id.

Topic
Syntax: T or Txx

-- Page mode --

In page mode, the T command switches the user to topic mode. (Topic mode is used to view or alter the organization or hierarchy of the knowledge base, while page mode is used to view or alter the actual contents of a particular topic in the hierarchy.)

-- Topic mode --

In topic mode, this command allows a user to move about in the organizational hierarchy of topics.

T steps up one level in the hierarchy by invoking the next higher topics.

T0 invokes the root topics at the top of the hierarchy.

Txx selects the specified subtopic from among the displayed selections, where xx is between 1 and the number of available subtopics.

Note: If the subtopic name begins with "EXECUTE xxxxx", then Privatization Planner(tm) will store in a file the user's current position in the knowledge base (along with other information), and begin execution of program module xxxxx (for instance a gateway program into another information network or a market analysis program which charts prices or otherwise analyzes price history in support of trading decisions). Upon completion of program xxxx, the user types (at the operating system prompt) "RESUME", which reads the file updated by the EXECUTE xxxx subtopic in order to restore the user to the same position in the knowledge base.

Error conditions:
If xx specifies an unavailable topic, the user is notified and prompted to try again.

User
Syntax: U or Uid;

where id corresponds to the character string identifying a particular user.

If "U" is entered without an id, the system presents the id and name of each available user (optionally sorted by cross-correlation with the requesting user), and provides an opportunity to select each in turn.

If "U" is entered with an id, the system verifies the id is accessible and then presents information appropriate to that user.

-- Topic Mode --

If the id specified in the "U" command does not correspond to that of the logged-on user, he or she will be prevented from executing Add, Replace, Delete or Name commands.

On the other hand, if the id specified in the "U" command corresponds to that of the logged-on user, he or she will be given an opportunity to "adopt" the organization and contents, for the current topic, of either the default version or the version another user.

The system first informs the logged-on user whether he or she already has a personally customized setup for the current topic. It then asks whether the logged-on user wishes to "adopt" as his or her own, and therefore accessible to future revision, the default topic organization and page layout or that of another user.

-- Page Mode --

The User command in page mode allows the logged-on user, who is accessing the page contents of a second user's (or his or her own) topic setup as determined by the latest User command in topic mode, to view the entries of still a third user for the values of variables embedded in the page.

While the User command in page mode does not invoke a different user's organization or contents, the form and usage are exactly analogous to that in topic mode.

Values
Syntax: V

Each page can contain a series of variables embedded within the text, demarcated by a pair of braces "{...}". This command allows each logged-on user to enter his or her own judgment as to the best values for those variables. Each variable can be of arbitrary length and can take on the value of any sequence of alphanumeric characters.

The program will highlight each variable in turn, and prompt the user for a new entry. The user need not enter a value for all or any variables. On the other hand, if a user's judgment should change, additional subsequent entries supersede earlier ones.

Write
Syntax: Wxxxx

The Write command allows a user to send a message to a specific user. It is implemented using the Message subtopic of the System topic in the root directory, and is terminated with the eXit command.

The user types the message into a new page associated with a new entry at the Message node. This will be stored under the recipient's ID, and is the only time one user can alter information stored under another user's ID. The other user reads any messages by logging on, viewing the Message directory, and selecting messages to read from the list of subtopics.

After reading a message, the recipient can respond to it with another Write command and delete it with the Delete command.

eXit
Syntax: X

The eXit command terminates operation of the Customize, Help, Map, Order, Simulate and Write commands.

4. Knowledge Base Adaptation

A. Parameters Used to Evaluate Alternative Versions

The scoring algorithms rely on the evaluation of topics and pages. Three parameters are used in the process of transforming the set of evaluations into composite scores.

The first parameter relates to the issue of quality versus quantity. A purely "intensive" scoring system would score ten high quality pages of information equally to one such page. On the other hand, an "extensive" scoring system would score two mediocre pages twice as high as one.

On the assumption that the value of the data base is a combination of its quality and quantity, the parameter "extensivity" achieves this as follows:

value = (quality score) x (measure of quantity)^(extensivity)
or
value = (quality score)^(1-ext.) x (measure of quantity)^(ext.)

where both the quality score and the measure of quantity are greater than or equal to one, and the extensivity parameter is in the range from 0 (i.e., only quality matters) to 1 (i.e., the score is proportional to quantity).

Parameter "content" fixes relative weights of organization and content:

topic value=("content")x(evaluation of aggregated subtopic content)

+ (1 - "content") x (evaluation of organization)

where the parameter "content" is between 0 (i.e., only organization matters) and 1 (i.e., only content matters).

The final parameter "persist" increases the valuation of each component of the benchmark version, to require that a threshold of improvement be exceeded before changes are adopted:

(benchmark valuation) = (benchmark valuation)(1 + "persist"/100)

B. Algorithms Used to Evaluate Alternative Versions

The scores of topics are built up from the scores of components such as subtopics and pages.

The score of any given page VAL(page) is the average of all submitted evaluations, optionally deleting the X% highest and lowest scores to decrease the sensitivity to outlier evaluations. The score of the set of pages ("PMAP") constituting the content of a topic is:

VAL(PMAP) = (average VAL(page)) x (number of pages)^extensivity
or
VAL(PMAP) = (average VAL(page))^(1-ext.) x (number of pages)^ext.

The value of a set of subtopics is then:

VAL(subtopics) =

(average VAL(PMAP)) x (number of subtopics)^(extensivity)
or
(average VAL(PMAP))^(1-ext.) x (number of subtopics)^ext.

The value of a topic can then be calculated as:

VAL(topic) = ("content") x (VAL(subtopics))

+ (1 - "content") x (VAL(SMAP))

where SMAP is a given arrangement of subtopics, and VAL(SMAP) is the average evaluation of that organization.

5. Estimation of User Evaluations

Privatization Planner(tm) provides a user the ability to select and sort entries based on his or her own evaluation. If the user has not yet evaluated a particular entry, the system can provide an estimate derived from a regression analysis of entries which the user has evaluated versus other users' evaluations.

The estimation method is:

1. Formulate the two-dimensional evaluation array $E_{i,j}$, where i is the user index (u being the index for the user whose evaluations will be estimated) and j is the observation index.

2. Formulate the one-dimensional array $W^u_j$ as follows:

$$W^u_j = 1 + |E_{uj} - E_j|^\alpha$$

if there is an actual observation for $E_{uj}$, and

$$W^u_j = 0 \quad \text{otherwise.}$$

In this expression, $\alpha$ is a user-specifiable parameter whose default value is 0. This weight function, which provides the ability to weight more heavily observations where the user's evaluation differed most from the average, can be replaced by other weight functions.

3. Formulate the one-dimensional array $W^i_j$ for each $i \neq u$ as follows:

$$W^i_j = W^u_j \text{ if there is an actual observation for } E_{ij},$$

$$W^i_j = 0 \quad \text{otherwise.}$$

This ensures that there is a non-zero weight only where there are actual observations for both users u and i.

The preferred implementation is to already have summed the number of actual evaluations for each user, and to presort them by descending number, and then only consider the first X percentile according to processing power and response time constraints.

4. Perform a regression of $E_{uj}$ vs. $E_{ij}$ with weights $W^i_j$. The default functional form is linear as follows:

$$\hat{E}_{uj} = m_i E_{ij} + b_i,$$

although other functional forms such as polynomial or logarithmic are possible.

The preferred implementation is to first form two sums:
"regression observations" = $\sum_j W^i_j$, and
"# predictions" = number of instances where there is no observation for user u (and therefore needing an estimate) and there is an observation for user i (and therefore able to provide an estimate).
Then, the regression analysis is performed only against those users i for whom the two sums are in top Y and Z percentile respectively, or alternatively is not performed against those users i for whom those two sums are in the bottom Y and Z percentile respectively.

5. The estimate for each observation j which lacks an actual evaluation by user u is found by:

$$E_{uj} = \frac{\sum_{i \neq u} |r_i|^\beta \, [\sum_j W_{ij}]^\gamma \, E_{ij}}{\sum_{i \neq u} |r_i|^\beta \, [\sum_j W_{ij}]^\gamma}, \quad \text{where}$$

$r_i$ is the correlation coefficient for the selected functional form regressing $E_{uj}$ vs. $E_{ij}$;

$\beta$ is a user-specifiable parameter, whose default is 1, able to modulate the weight of the correlation coefficients;

$\gamma$ is a user-specifiable parameter, whose default is 1, able to modulate the significance of the sums of the weights of the observations used in the regression.

Notes: 1) This approach reduces the severe multi-collinearity problems which would result from a multiple-user regression analysis.

2) Other weight functions are possible. For example, the weight of the prediction of user i can be set to zero when user i and user u are anti-correlated (i.e., $r_i < 0$) by replacing $r_i$ in the above formula with the term $MAX(0,r_i)$. In addition, the user could restrict the regression analysis to a specified set of users.

# SUSTAINABLE DEVELOPMENT SERVER(tm)

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# Sustainable Development Server(tm)

PRELIMINARY DRAFT OF 9/1/93

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Section 1. Background

It is natural for individuals and groups to aspire to a clean environment and economic development for themselves and their progeny. These aspirations are evolving into two new human rights norms: the right to a safe environment and the right to development. At the same time, these dual aspirations are combining into a duty of states to pursue sustainable development under a new international public trust doctrine.

The immediacy of this challenge is clear, as the human population grows past five billion individuals on a finite, irreplaceable planet.

Unprecedented cooperation between academe, government and industry will be necessary to learn the science, develop the technology, train the leaders, formulate the policies, coalesce the support and commercialize the products and services necessary to achieve sustainable development.

The Sustainable Development Server(tm) is intended to serve as a focal point to facilitate the necessary development and interaction. Participants can review, evaluate and contribute to structured information in an adaptive knowledge base specializing in sustainable development. The philosophy of this approach is that the combination of powerful yet friendly software technology, an interesting, useful and well-structured initial knowledge base, and a knowledgeable and motivated user community, will yield a "critical mass". In this case, dynamic positive feedback loops will lead to improvements in the software technology, expansion of the knowledge base, and growth of the user community.

Section 2. The Conceptual Development of Sustainable Development

It is not enough to identify the problem. Even if the pursuit of sustainable development becomes acknowledged as a policy imperative by the leaders in academe, government and industry, this must be translated into specific choices and concrete actions. Sustainable development must evolve beyond a cliche into a mature, operational concept.

One approach, following MIT economist Robert Solow, is to inventory all forms of capital and track whether they are increasing in the aggregate. From this perspective, a diminution in one form of capital can be compensated by an increase in another. For example, even economic development of part of a rainforest which was effectively invested in human capital through education could be consistent with sustainable development.

This aggregate-capital conceptual structure is outlined in Figure 1. Capital assets (and liabilities!) are categorized into non-human assets (biological, environmental and natural resources) and human social assets (human resources, intangible products and tangible products). Assets (and liabilities) are subject to intra- and inter-category transfers by individuals and organizations.

Policy instruments such as regulations (e.g., prescriptive, performance, taxation) or the establishment of bundles of property rights along with their transfer mechanisms (e.g., gift, sale, rent) affect the behavior of individuals and organizations.

Taken together, sets of assets and associated policy instruments constitute portfolios. These portfolios can be associated with individuals, enterprises, countries, regions or the world.

A central focus of sustainable development is the choice of technique to value and to aggregate such portfolios, taking into account appropriate constraints imposed by distributional equity.

Figure 1. Sustainable Development
From the Perspective of Aggregate Capital

## Assets (and Liabilities)

### Non-Human Assets

| Biological Resources Resources | Environmental Assets | Natural |
|---|---|---|
| - plant kingdom | - capacity to degrade, | - air |
| - animal kingdom | dilute or store | - water |
| - ecosystems | harmful products | - minerals |
| - biomes | - natural settings | - land |

### Human Social Assets

| Human Resources Products | Intangible Products | Tangible |
|---|---|---|
| - population | - architecture | -agriculture |
| - training | - art | -armaments |
| informal | - government | -consumer goods |
| health | - knowledge | -conveyances |
| vocational | - languages | -infrastructure |
| elementary | - law | -productive |
| secondary | - literature | equipment |
| university | - music | |
| continuing | - performance art | |
| | - tedchnology | |

### Policy Instruments

- regulation (e.g., prescriptive, performance, taxation)
- establishment of bundles of property rights, along with mechanisms for their transfer (e.g., gift, sale, leasing, rent)
- alternative valuations of assets (and liabilities)

Assets (and liabilities) are subject to intra- and inter-category transfers by individuals and organizations. These transfers are affected by the choice of policy instruments. Taken together, the assets (and liabilities) and policy instruments constitute a portfolio associated with individuals or groups. The valuation and aggregation of such portfolios, subject to appropriate equity constraints, is a central focus of sustainable development.

Section 3. Sustainable Development Server:(tm)
A Collaborative Knowledge Base

A collaborative knowledge base is the product of a knowledge building community which constructs patterns of knowledge through sociocultural activity, while renewing itself through ongoing apprenticeship.[1] Education has typically involved the assignment of tasks or the orchestration of a novice's development.[2] In contrast, a knowledge building community helps novices "formulate their own goals, do their own activating of prior knowledge, ask their own questions, direct their own inquiry, and do their own monitoring of comprehension."[3] In the development of the science and policies to further sustainable development, collaboration is mutually beneficial as the knowledge base grows cumulatively, if not exponentially. Therefore, it is essential for representatives from academe, government and industry to coalesce into an effective knowledge building community.

A knowledge building community of environmental and policy analysts can be promoted by the Sustainable Development Server™, a collaborative knowledge base generator. It is initialized with a hierarchy of topics containing pages of information. This knowledge base is distributed by the system coordinator to knowledgeable and motivated users by diskette, or made available on an electronic network. Users can then evaluate and comment on its organization and content or propose changes.

For example, the first menu of topics includes "Academic Programs", "Best Practices", "Bibliography", "Consortium Members", "Employment and Services", "Information Networks", and "Suggested Imporvements to the System". The user could choose the "Academic Programs" topic , select the "Massachusetts Institute of Technology" subtopic, and then explore the different course listings, departmental programs and research programs with an environmental aspect.

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[1]See M. Scardamalia, C. Bereiter, "An Architecture for Collaborative Knowledge Building" 2, in E. De Corte, M. Linn, H. Mandl, L. Verschaffel (eds.), "Computer-Based Learning Environments and Problem Solving", NATO-ASI Series F.: Computer and Systems Sciences (in press).

[2]M. Scardamalia, C. Bereiter, "Higher Levels of Agency for Children in Knowledge Building: A Challenge for the Design of New Knowledge Media", 1 (No. 1) Journal of Learning Sciences 37, 38-39 (1991).

[3]Id. at 39.

At this point the user has a variety of options before moving on to another topic. He or she can respond to questions embedded in the information pages (such as whether to be placed on a mailing list for additional information). The user can also evaluate and comment on the presentation of the topic, and thereby influence whether or not it will be retained into the next generation. Another option is to insert proposed new pages of information or even additional related subtopics. The proposed additions can also contain embedded questions, and will also be subject to evaluation and comments.

The system coordinator compiles all responses and makes comments available to the relevant authors for review. After either manually or algorithmically determining the "best" versions and alternates of the knowledge base from the evaluations provided by the analysts, the next generation is distributed and undergoes another cycle of review.

Design choices reflect the objective to achieve a clean, simple and cost-effective system. While there is a login sequence to identify responders, security is provided by transmission of diskettes to and from known groups ineligible to sign with other users' ids. While proposed topics and pages of information are available to all users for review, comments are only made available to the relevant authors. This preserves the independence of future comments and simplifies processing, but at the expense of intellectual interaction. The algorithms to "score" the topics and pages of information are straightforward functions of quality and quantity, subject to parameter-tuning or even manual override in practice. Finally, pop-up windows for simultaneous topics, help screens or glossaries may be desirable.

Section 4. Operation of the Sustainable Development Server(tm)

A. From the Perspective of an Individual User

Each user is provided a diskette containing the executable module "sds.exe", and a hierarchical data base of sustainable development information contained in directory "sds". The user first copies these onto disk when available, and then types:

sds

The system then prompts as follows:

Enter disk drive for sds file [e.g., 'c:']:

Enter directory of sds file [e.g., 'sds']:

In each case, the suggested answers constitute an appropriate default.

At this point, the program displays the top of the hierarchical "table of contents" in "page mode", and awaits user commands (see sections 5 and 6).

Upon completion of the user's review, the data base will include his or her evaluations and proposed changes. The user then copies the data base back to diskette and forwards it to the system coordinator for compilation and analysis.

B. From the Perspective of the System Coordinator

The job of the system coordinator can be parsed into a series of tasks:

i) The current version of the executable program file and the hierarchical data base is distributed to a select set of interested and knowledgeable users.

ii) The users explore those portions of the data base which are of relevance and interest to them. In the process, they have the ability to enter their opinions for the values of variables, to evaluate and comment on topic layouts and page contents, and to propose additions, replacements or deletions to topics and/or pages.

Note that the security system amounts to the transmission of the diskette to and from known users. The software supports the ability for each distributee to circulate the original diskette or a copy of it among additional users (who would have the same ability).

However, since all the users of a given physical diskette would have the ability to alter or override each other's responses, this should be limited to knowledgeable and interested persons in a position of privity to the original distributee.

In addition, where the system is used in a "closed end" automatic optimization mode, where the evaluations of a known set of users determine the versions preserved into subsequent distribution cycles, if the distributee includes additional users then a single "optimal" representation of the distributee's entire group can be formulated.

iii) The diskettes are returned to the system coordinator, who aggregates them by copying directories and files onto a disk partition, and then onto a composite diskette or diskettes. The composite diskette(s) are then redistributed for evaluation and comment. Note that if necessitated by the quantity of information, different subsets of the composite data base can be distributed to different users for this evaluation phase.

iv) A single diskette is then prepared for each user, containing his or her own topic setup and page contents, in addition to all evaluations, comments and entries for values of variables.

This user is then given an opportunity to make modifications based on that feedback, and return a new version to the system coordinator.

v) The system coordinator again copies directories and files onto a disk partition, and then runs the following modules when available:
-- "vacuum", which cleans out all unused files and directories;
-- "evaluate", an optional step which tags the nodes of the hierarchical data base with values calculated according to the scoring parameters and algorithms in the Appendix;
-- "select", which copies to diskette(s) several versions: the "optimal thread" through the hierarchical data base for each of the last N generations (with ids of G1, ..., GN) and all contributions from the H highest-scoring users in the current generation.

vi) The selected versions are then distributed at the start of a new "generation", corresponding to step (i).

vii) For implementation on an electronic network physical distribution of diskettes is unnecessary, and standard security procedures for access and login would apply.

Section 5. User Commands Available in Topic Mode

Topic mode displays and supports alteration of the hierarchical organization of topics covered in the system. It can be thought of as an interactive, hierarchical table of contents.

A series of commands is available in topic mode:

Topic
Syntax: T or Txx
where xx is between 0 and the number of available topics at this level in the hierarchy. Note that in this and subsequent commands, either capitals or the lower case is acceptable.

This command allows a user to move about in the organizational hierarchy of topics.

T steps up one level in the hierarchy by invoking the next higher topics.

T0 reverts to the top of the hierarchy by invoking the root topics.

Txx selects the specified topic from among the displayed selections.

Error conditions:
If xx specifies an unavailable topic, the user is notified and prompted to try again.

Add
Syntax: A or Axx
where xx is between 0 and the number of topics available at this level in the hierarchy.

This command allows a user to add a topic at the current level in the hierarchy.

A appends a new topic after existing topics.

Axx adds a new topic before topic number xx, except "A0" is equivalent to "A".

After creating the new topic, the user is prompted to enter its heading.

Error condition:

1. If xx specifies an unavailable topic, the user is notified and prompted to try again.

2. While one user may view another user's topic organization, modification of it is not allowed.

Replace
Syntax: Rxx
where xx is between 1 and the number of topics available at this level.

This command allows a user to replace a topic in the current level in the hierarchy.

After deleting the current version of the topic, the user is prompted to enter the heading of the replacement version.

Error conditions:

1. If xx specifies an unavailable topic, the user is notified and prompted to try again.

2. While one user may view another user's topic organization, modification of it is not allowed.

Delete
Syntax: Dxx
where xx is between 1 and the number of topics available at this level.

This command allows a user to delete a topic in the current level in the hierarchy.

Error conditions:

1. If xx specifies an unavailable topic, the user is notified and prompted to try again.

2. While one user may view another user's topic organization, modification of it is not allowed.

Heading
Syntax: H

This command allows a user to change the heading of the current topic.

The user is prompted to enter the new heading of the current topic.

Note: to change the heading of one of the subtopics available from the current topic, that topic must first be invoked with the "Topic" command before using the "Heading" command. While that topic could have been deleted without changing to it, its contents or "pages" of information would have been lost.

Error condition:

A user is not allowed to modify another user's topic.

Eval
Syntax: E

This command allows a user to evaluate the organization of the current topic, and to enter any comment on it.

The program first requests an evaluation as follows:

Please evaluate this topic (1 = very poor, 5 = very good):

The user has the option to enter a number from 1 to 5, with 3 being neutral.

The program then requests any comment:

Please enter any comment on this topic:

The user then has the option to enter a comment, terminated by a "carriage return" or "enter" keystroke.

Error condition:

If the logged-on user is in his or her own setup, the Eval command is unavailable.

Page Mode
Syntax: P

This command allows the user to switch from topic mode to page mode. Topic mode is used to view or alter the organization or hierarchy of the information base, while page mode is used to view or alter the actual contents of a particular topic in the hierarchy.

User
Syntax: U or Uid;

where id corresponds to the character string identifying a particular user.

If "U" is entered without an id, the system presents the id and name of each available user, providing an opportunity to select each in turn.

If "U" is entered with an id, the system verifies the id is accessible and then displays the topics according to that user.

If the id specified in the "U" command does not correspond to that of the logged-on user, he or she will be prevented from executing Add, Replace, Delete or Heading commands.

On the other hand, if the id specified in the "U" command corresponds to that of the logged-on user, he or she will be given an opportunity to "adopt" the organization or contents, for the current topic, of the user previously being presented.

The system first informs the logged-on user whether he or she already has a personally customized setup for the organization of the current topic. It then asks whether the logged-on user wishes to "adopt" as his or her own, and therefore accessible to future revision, the topic organization of the user previously being presented.

The system then informs the logged-on user whether he or she already has a personally customized setup for the page layout and contents of the current topic. It then asks whether the logged-on user wishes to "adopt" as his or her own, and therefore accessible to future revision, the page layout and contents of the user previously being presented.

Quit
Syntax: Q

This command gracefully terminates operation of the program, returning the user to the operating system.

Section 6. User Commands Available in Page Mode

Page mode displays and supports alteration of the contents of pages of information relevant to the current topic within the hierarchical data base. The topic can be thought of as part of the table of contents, while the pages are the actual information so addressed.

A series of commands is available in page mode:

Page
Syntax: P or Pxx
where xx is between 0 and the number of available pages at this level in the hierarchy.

P increments the page counter to display the contents of the next page, and is invalid if the last page is already being displayed.

Pxx displays the contents of the specified page, except that P0 has the same effect as P.

Error conditions:

If xx specifies an unavailable page, the user is notified and prompted to try again.

Add, Replace, Delete, Eval

These commands are exactly analogous in form and function to their usage in topic mode, except that in page mode they refer to the appropriate page associated with the current topic.

Topic Mode
Syntax: T

This command allows the user to switch from page mode to topic mode. Topic mode is used to view or alter the organization or hierarchy of the information base, while page mode is used to view or alter the actual contents of a particular topic in the hierarchy.

User

This command allows the logged-on user , who is accessing the page contents of a second user's (or his or her own) topic setup as determined by the latest User command in topic mode, to view the

entries of still a third user for the values of variables embedded in the page.

While the User command in page mode does not invoke a different user's organization or contents, the form and usage are exactly analogous to that in topic mode.

Values
Syntax: V

Each page can contain a series of variables embedded within the text, as demarcated by a pair of braces "{...}". This command allows each logged-on user to enter his or her own judgment as to the best values for those variables.

The program will highlight each variable in turn, and prompt the user for a new entry. The user need not enter a value for all or any variables. On the other hand, if a user's judgment should change, additional subsequent entries supersede earlier ones.

Quit

This command is equivalent in form and function to its usage in topic mode.

Appendix: Knowledge Base Adaptation

A. Parameters Used to Evaluate Alternative Versions

The scoring algorithms rely on the evaluation of topics and pages. Three parameters are used in the process of transforming the set of evaluations into composite scores.

The first parameter relates to the issue of quality versus quantity. A purely "intensive" scoring system would score ten high quality pages of Information equally to one such page. On the other hand, a purely "extensive" scoring system would score two mediocre pages twice as high as one.

On the assumption that the value of the data base is a combination of its quality and quantity, the parameter "extensivity" achieves this as follows:

value = (quality score) x (measure of quantity)^(extensivity)

where both the quality score and the measure of quantity are greater than or equal to one, and the extensivity parameter is in the range from 0 (i.e., only quality matters) to 1 (i.e., the score is proportional to quantity).

Parameter "content" fixes relative weights of organization and content:

topic value=("content")x(evaluation of aggregated subtopic content)

+ (1 - "content") x (evaluation of organization)

where the parameter "content" is between 0 (i.e., only organization matters) and 1 (i.e., only content matters).

The final parameter "persist" increases the valuation of each component of the benchmark version, to require that a threshold of improvement be exceeded before changes are adopted:

(benchmark valuation) = (benchmark valuation)(1 + "persist"/100)

B. Algorithms Used to Evaluate Alternative Versions

The scores of topics are built up from the scores of components such as subtopics and pages.

The score of any given page [VAL(page)] is the average of all submitted evaluations. The score of the set of pages ("PMAP") constituting the content of a topic is:)

VAL(PMAP) = (average VAL(page)) x (number of pages)^extensivity

The value of a set of subtopics is then:

VAL(subtopics) =

(average VAL(PMAP)) x (number of subtopics)^(extensivity)

The value of a topic can then be calculated as:

VAL(topic) = ("content") x (VAL(subtopics))

+ (1 - "content") x (VAL(SMAP))

where SMAP is a given arrangement of subtopics, and VAL(SMAP) is the average evaluation of that organization.

Sustainable Development Server(tm) page 1 of 2 Mon Aug 30 22:31:10 1993
Sustainable Development Server(tm) Version 1.0
------You are sys mgr, looking at the primary version, with default values------

Sustainable Development Server(tm), copyright William J. Hartnett, 1993

This collaborative knowledge base is designed to support the pursuit of sustainable development. It includes a hierarchical table of contents of "topics", with information contained in corresponding "pages".

The initial knowledge base will include information on academic programs, best practices, bibliography, employment, information networks, and suggestions for improvements to the system.

[... Look to the bottom line for command options. For example, to see the next page type "P"; and to switch to topic mode type "T" ...]

Enter command: P

| Page | Add | Replace | Delete | Values | Eval | Topic | User | Quit |
|---|---|---|---|---|---|---|---|---|
| 1- 2 | 1- 2 | 1- 2 | 1- 2 | | | mode | [id] | |

---

Sustainable Development Server(tm) page 2 of 2 Mon Aug 30 22:31:17 1993
Sustainable Development Server(tm) Version 1.0
------You are sys mgr, looking at the primary version, with default values------

This collaborative knowledge base is designed to be systematically updated.

The software supports the ability of users to evaluate and comment upon individual screens and pages. Users can also propose additions, replacements and deletions of individual screens and pages.

User evaluations determine which parts of the collaborative knowledge base are sufficiently "adaptive" to survive into the next generation.

Proposed changes are included as alternatives which compete with the new primary version.

[...To see what topics are available, switch to topic mode by typing "T"...]

Enter command: T

| Page | Add | Replace | Delete | Values | Eval | Topic | User | Quit |
|---|---|---|---|---|---|---|---|---|
| 1- 2 | 1- 2 | 1- 2 | 1- 2 | | | mode | [id] | |

```
Sustainable Development Server(tm)                    Mon Aug 30 22:35:27 1993
                Sustainable Development Server(tm)   Version 1.0
------You are sys mgr, looking at the primary version, with default values------
T  for next higher topics;   T0  for root topics;   P  for page contents.

T1 Academic Programs
T2 Best Practices
T3 Bibliography
T4 Consortium Members
T5 Employment and Services
T6 Information Networks
T7 Suggested Improvements to the System



Enter command: T1

Topic   Add   Replace   Delete   Heading   Eval   Page   User   Quit
 0- 7   1- 7   1- 7      1- 7                     mode   [id]
```

---

```
Sustainable Development Server(tm)                    Mon Aug 30 22:52:26 1993
                          Academic Programs
------You are sys mgr, looking at the primary version, with default values------
T  for next higher topics;   T0  for root topics;   P  for page contents.

T1 California Institute of Technology
T2 Massachusetts Institute of Technology



Enter command: P

Topic   Add   Replace   Delete   Heading   Eval   Page   User   Quit
 0- 2   1- 2   1- 2      1- 2                     mode   [id]
```

Sustainable Development Server(tm) page 1 of 1 Mon Aug 30 22:53:02 1993
Academic Programs
------You are sys mgr, looking at the primary version, with default values------

A wide range of academic programs supports the pursuit of sustainable development. These can be categorized as degree programs and research programs.

Degree programs are available at the undergraduate and graduate levels, in departments ranging from law, public policy or political science to science or engineering.

Academic research programs focus faculty, staff and student resources on different issues relating to sustainable development.

Enter command: T, T2

| Page | Add | Replace | Delete | Values | Eval | Topic | User | Quit |
|---|---|---|---|---|---|---|---|---|
| 1- 1 | 1- 1 | 1- 1 | 1- 1 | | | mode | [id] | |

---

Sustainable Development Server(tm) Mon Aug 30 22:53:15 1993
Massachusetts Institute of Technology
------You are sys mgr, looking at the primary version, with default values------
T for next higher topics; T0 for root topics; P for page contents.

T1 MIT Environmental Course Listings
T2 MIT Departmental Programs with Environmental Aspects
T3 MIT Research Programs Involving the Environment

Enter command: T1

| Topic | Add | Replace | Delete | Heading | Eval | Page | User | Quit |
|---|---|---|---|---|---|---|---|---|
| 0- 3 | 1- 3 | 1- 3 | 1- 3 | | | mode | [id] | |

Sustainable Development Server(tm) Mon Aug 30 22:58:06 1993
MIT Environmental Course Listings
------You are sys mgr, looking at the primary version, with default values------
T for next higher topics; T0 for root topics; P for page contents.

T1 1.725J Chemicals in the Environment: Fate and Transport
T2 1.811J Environmental Law: Pollution Control
T3 1.812J Regulation of Chemical Toxins, Radiation, and Biotechnology
T4 1.972 Environmental Restoration Engineering
T5 3.576J Law, Technology, and Public Policy
T6 10.72J Chemicals in the Environment: Sources and Control
T7 10.805J Technology, Law, and the Working Environment
T8 11.328J Science and Technology in International Affairs
T9 11.334 Environmental Pollution: Problems, Solutions, and Policy
T10 11.361 Environmental Policy and Regulation
T11 11.362 Environmental Management
T12 11.363J Chemicals in the Environment: Policy and Management
T13 11.364 International Environmental Negotiation
T14 12.300 Environmental Chemistry and Climate Change
T15 17.301/2 Science, Technology and Public Policy
Enter command: T2,P

| Topic | Add | Replace | Delete | Heading | Eval | Page mode | User [id] | Quit |
|---|---|---|---|---|---|---|---|---|
| 0-18 | 1-18 | 1-18 | 1-18 | | | | | |

---

Sustainable Development Server(tm) page 1 of 1 Mon Aug 30 22:58:18 1993
1.811J Environmental Law: Pollution Control
------You are sys mgr, looking at the primary version, with default values------

Reviews and analyzes Federal and state regulation of air and water pollution and hazardous wastes. Emphasizes use of legal mechanisms and alternative approaches (such as economic incentives) to control pollution. Focuses on the major Federal legislation, the underlying administrative system, and the common law in analyzing the goals of pollution control, economic consequences, and the role of the courts. Discusses both classical pollutants and toxic industrial chemicals. Also provides an introduction to basic legal skills.

N.A. Ashford, C.C. Caldart

Enter command: T, T, T, T2

| Page | Add | Replace | Delete | Values | Eval | Topic mode | User [id] | Quit |
|---|---|---|---|---|---|---|---|---|
| 1- 1 | 1- 1 | 1- 1 | 1- 1 | | | | | |

Sustainable Development Server(tm) Mon Aug 30 23:06:55 1993
MIT Departmental Programs with Environmental Aspects
------You are sys mgr, looking at the primary version, with default values------
T for next higher topics; T0 for root topics; P for page contents.

T1 Civil and Environmental Engineering
T2 Earth and Atmospheric Sciences
T3 Division of Toxicology
T4 Urban Studies and Planning
T5 School of Engineering
T6 School of Science
T7 Sloan School of Management
T8 Woods Hole/MIT Joint Program in Oceanography and Oceanographic Engineering
T9 MIT Technology and Policy Program

Enter command: T9, P

| Topic | Add | Replace | Delete | Heading | Eval | Page mode | User [id] | Quit |
|---|---|---|---|---|---|---|---|---|
| 0- 9 | 1- 9 | 1- 9 | 1- 9 | | | | | |

---

Sustainable Development Server(tm) page 1 of 1 Mon Aug 30 23:07:24 1993
MIT Technology and Policy Program
------You are sys mgr, looking at the primary version, with default values------

The Technology and Policy Program is an interdisciplinary graduate program designed for "engineers and scientists with a difference", professionals with a strong technical foundation who also have the ability to deal with important social concerns. Masters and doctoral students in the program work on problems covering the wide range of technical fields available at MIT, including environmental studies.

The curriculum has two parallel tracks, one with a focus on engineering and the physical sciences and one with a focus on the social sciences. The curricula of both tracks include three subjects in policy analysis and three subjects in an integrated core selected by the student and his or her advisor. Thesis topics are often based on research projects that include both technical and policy components. Typical topics in environmental studies include priority setting and enforcement in hazardous waste remediation, water conservation and pricing, and the economic and environmental impacts of alternative energy policies. Faculty comes from Engineering, Political Science and Urban Studies.
Enter command: T, T0, T3

| Page | Add | Replace | Delete | Values | Eval | Topic mode | User [id] | Quit |
|---|---|---|---|---|---|---|---|---|
| 1- 1 | 1- 1 | 1- 1 | 1- 1 | | | | | |

Sustainable Development Server(tm) Mon Aug 30 23:09:14 1993
Bibliography
------You are sys mgr, looking at the primary version, with default values------
T for next higher topics; T0 for root topics; P for page contents.

T1 Author Listings
T2 Solow Literature Search (By Author)
T3 Right to Development
T4 Structured Bibliography

Enter command: T1, F, F, F

| Topic | Add | Replace | Delete | Heading | Eval | Page mode | User [id] | Quit |
|---|---|---|---|---|---|---|---|---|
| 0- 4 | 1- 4 | 1- 4 | 1- 4 | | | | | |

---

Sustainable Development Server(tm) Mon Aug 30 23:19:04 1993
Author Listings
------You are sys mgr, looking at the primary version, with default values------
T for next higher topics; T0 for root topics; P for page contents.

T211 Meadows, D., Smart Development, Not Dumb Growth
T212 Mendes, C., Fight for the forest.
T213 Merchant, C., Radical ecology: the search for a livable world.
T214 Mikesell, R., Economic development and the environment: a comparison of sus
T215 Minkow, D.; Murphy-Dunning C., Assault on Papua New Guinea.
T216 Miyamoto, J., Tackling Environmental Issues in Companies
T217 Moline, M., Debt-for-Nature Exchanges: Attempting to Deal Simultaneously wi
T218 Morandini, N., La cumbre de Rio fue un rugido de raton.
T219 Mourmouras, A., Competitive Equilibria and Sustainable Growth in a Life-Cyc
T220 Mumtaz, S.; Durr-e-Nayab, Management Arrangements of the Chaprote Forest an
T221 Musu, I., Economia e ambiante. (Economics and Environment. With English sum
T222 Myers, N., The Environmental Basis of Sustainable Development
T223 Newall, J., The Challenge of Competitiveness
T224 Nicolaisen, J.; Hoeller, P., Org. for Econ. Coop. and Development. Dept. of
T225 Nijkamp, P.; van den Bergh, J.; Soeteman, F.; Parikh, K.; Magrath, W., Regi
Enter command: T211, P

| Topic | Add | Replace | Delete | Heading | Eval | Page mode | User [id] | Quit |
|---|---|---|---|---|---|---|---|---|
| 0-356 | 1-356 | 1-356 | 1-356 | | | | | |

Sustainable Development Server(tm) page 1 of 2 Mon Aug 30 23:39:55 1993
Meadows, D., Smart Development, Not Dumb Growth
------You are sys mgr, looking at the primary version, with default values------

Fulll Citation:

Meadows, D., "Smart Development, Not Dumb Growth", 95(6) Technology Review 68-69 (Aug/Sep 1992).

Enter command: P

| Page | Add | Replace | Delete | Values | Eval | Topic mode | User [id] | Quit |
|---|---|---|---|---|---|---|---|---|
| 1- 2 | 1- 2 | 1- 2 | 1- 2 | | | | | |

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Sustainable Development Server(tm) page 2 of 2 Mon Aug 30 23:40:02 1993
Meadows, D., Smart Development, Not Dumb Growth
------You are sys mgr, looking at the primary version, with default values------

Abstract (ABI): The recent US history of stimulating economic growth at any cost is precisely what has created the current difficulties. Smart development builds on a region's unique skills and resources and encourages durable local business, while dumb growth entices a big corporation, which exerts control from outside, drains profits back outside, undercuts local manufacturers, and lays off hundreds of people without warning. Dumb growth also disregards many infrastructure investments because they do not pay off visibly enough or soon enough. Drawing a distinction between sustainable development and unsustainable growth does not mean being anti-economic; it means being practical and creating an economy that does not delude itself with booms that create their own busts or with drawing down and polluting the resources of the earth upon which all economic activity depends.

Enter command: T, TO

| Page | Add | Replace | Delete | Values | Eval | Topic mode | User [id] | Quit |
|---|---|---|---|---|---|---|---|---|
| 1- 2 | 1- 2 | 1- 2 | 1- 2 | | | | | |

```
Sustainable Development Server(tm)                    Mon Aug 30 23:41:14 1993
                Sustainable Development Server(tm)   Version 1.0
------You are sys mgr, looking at the primary version, with default values------
T  for next higher topics;   T0  for root topics;   P  for page contents.

T1 Academic Programs
T2 Best Practices
T3 Bibliography
T4 Consortium Members
T5 Employment and Services
T6 Information Networks
T7 Suggested Improvements to the System



Enter command:  T4

Topic    Add    Replace    Delete    Heading    Eval    Page    User    Quit
 0- 7    1- 7    1- 7       1- 7                        mode    [id]
```

---

```
Sustainable Development Server(tm)                    Mon Aug 30 23:41:25 1993
                          Consortium Members
------You are sys mgr, looking at the primary version, with default values------
T  for next higher topics;   T0  for root topics;   P  for page contents.

T1 Academe
T2 Government
T3 Industry
T4 International Agencies
T5 Non-Governmental Agencies (NGOs)



Enter command:  T, T5

Topic    Add    Replace    Delete    Heading    Eval    Page    User    Quit
 0- 5    1- 5    1- 5       1- 5                        mode    [id]
```

```
Sustainable Development Server(tm)                    Mon Aug 30 23:41:35 1993
                          Employment and Services
------You are sys mgr, looking at the primary version, with default values------
T  for next higher topics;   T0  for root topics;   P  for page contents.

T1 Consultancies
T2 Law Firms
T3 Positions Available

Enter command: T, T6

Topic   Add    Replace    Delete    Heading    Eval    Page    User    Quit
 0- 3   1- 3   1- 3       1- 3                        mode    [id]
```

---

```
Sustainable Development Server(tm)                    Mon Aug 30 23:41:45 1993
                          Information Networks
------You are sys mgr, looking at the primary version, with default values------
T  for next higher topics;   T0  for root topics;   P  for page contents.

T1 On-line Computer Networks
T2 Off-line Computer Networks
T3 Other Information Networks

Enter command: Q

Topic   Add    Replace    Delete    Heading    Eval    Page    User    Quit
 0- 3   1- 3   1- 3       1- 3                        mode    [id]
```

CLAIMS

1. A method of operating a digital computer to support the execution of transactions to buy and sell assets maintained in portfolios of diverse asset owners, comprising the steps of:

collecting for execution portfolio transactions submitted by portfolio owners;

aggregating the collected transactions into a single transaction data base; and

consummating the market transactions aggregated in the transaction data base, by matching buy and sell transactions of substantially but not necessarily equal parameters.

2. The method of claim 1 further including the step of updating the portfolios to account for the consummated transactions.

3. The method of claim 1 further including the step of transmitting the consummated market transactions to financial intermediaries specified by particular portfolio owners.

4. The method of claim 1 wherein the step of consummating comprises the steps of:

establishing an estimated asset price;

successively approximating the asset price until convergence is reached between buy and sell transactions.

5. A method to aggregate private rights to state-owned enterprises into a "Stock Market Unit" which achieves

immediateprivatization without the need to value enterprises, comprising the steps of:

specifying an interval over which all enterprises of a particular category will be included in the Stock Market Unit;

for each individual who is to share in the ownership of said enterprises, establishing on a mass storage unit of a digital computer system an asset ownership file; and

crediting to each said asset ownership file one share in each such enterprise.

6. A computer-implemented method of creating a liquid market in annuity instruments comprising the steps of:

defining in a computer memory standardized actuarial tables;

operating the computer to match offered annuity instruments with bid annuity instruments according to characteristics specified by particular bidders and offerors; and

calculating and assigning as the price of such matched instruments the implcit interest rate in association with a particular standardized actuarial table.

7. A computerized method of operating a market system for the service of exercising delegated investment authority over a

portfolio, comprising the steps of:

in a computer memory, building a file identifying delegatees qualified to exercise investment authority over portfolios;

operating the computer to accept bids for the services of delegatees and offers of the services of delegatees wherein the compensation of the delegatee may be specified as either a percentage of assets to be traded or a percentage of total return;

operating the computer to clear the market by determining those delegatee remunerations which satisfy the greatest quantity of delegations subject to maximum constraints by delegatee.

8. A computerized method of polled shareholder voting on corporate resolutions, comprising the steps of:

specifying to the computrer a threshhold above which a shareholder is considered large;

specifying to the computer a number of small shareholders to sample;

operating the computer to generate a list of corporate shareholders before whom the corporate resolution should be placed, including each large shareholder and a statistical sample of small shareholders.

9. A method of operating a computerized knowledge data base which evolves based on user evaluations and proposed contributions, comprising the steps of:

operating the computer to receive from a user proposed contributions to the adaptive knowledge base;

providing a user the ability to evaluate the organization and contents of the knowledge base, including new proposed contributions of other users;

selecting those portions of the knowledge base to preserve as a function of evaluations.

10. A method of operating a computerized data base which provides access to data base entries based on evaluations of said entries by any user or users, comprising the steps of:

associating entries with user evaluations of said entries; and

providing a user the ability to key access to entries according to the evaluations of any specified user or users.

11. A method of operating a computerized data base which provides a user access to entries therein based on estimates of the user's own evaluations, comprising the steps of:

correlating the user's past actual evaluations of

entries with evaluations of those entries by other users;

using those correlations, estimating the user's evaluations in the for an entry for which the user has not entered an actual evaluation.

12. A method of operating a computerized data base which is distributed by segment to users based on their expressions of interest in different components of the data base, comprising the steps of:

providing the user the capability to hierarchically tag portions of the data base with an indicator of interest;

providing the user the capability to specify the quantity of information from the data base to be received in response to a query;

probabilistically selecting portions of the data base for distribution as a function of interest level.

13. A method of operating a computerized data base by which a user can define his own structure of keyword access, comprising the steps of:

providing the user the capability to specify new keywords according to a boolean pattern of words or phrases contained in an entry; and

providing the user the capability to override this default definition for specific entries in the data base.

14. A method of operating a computerized data base which provides a gateway to other data bases or access to other program modules, comprising the steps of:

identifying as a selection alternative at a particular location in the data base a gateway or program module; and

providing the user the capability to store the current context of the data base, invoke the specified gateway or program module, and subsequently resume data base operation.

15. A method comprised of any combination of the methods of claims 1 through 14 wherein the data base is an adaptive knowledge base.

16. A method comprised of any combination of the methods of claims 1 through 13 in which an adaptive knowledge base is used to interface to a simulated or actual computerized marketplace.

17. A method comprised of any combination of the methods of claims 1 through 16 in which assets are distributed to a large number of owners.

Fig. 1

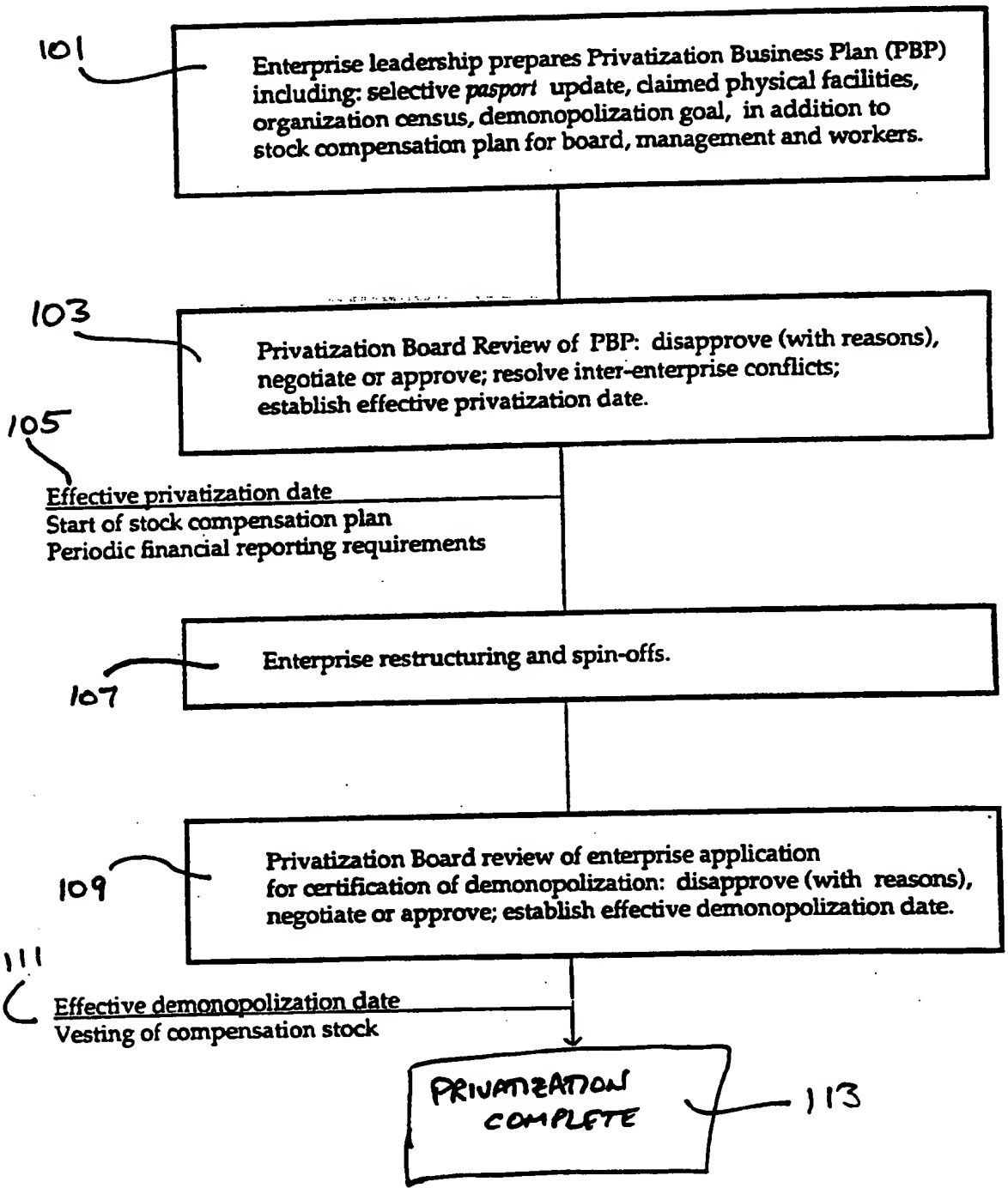
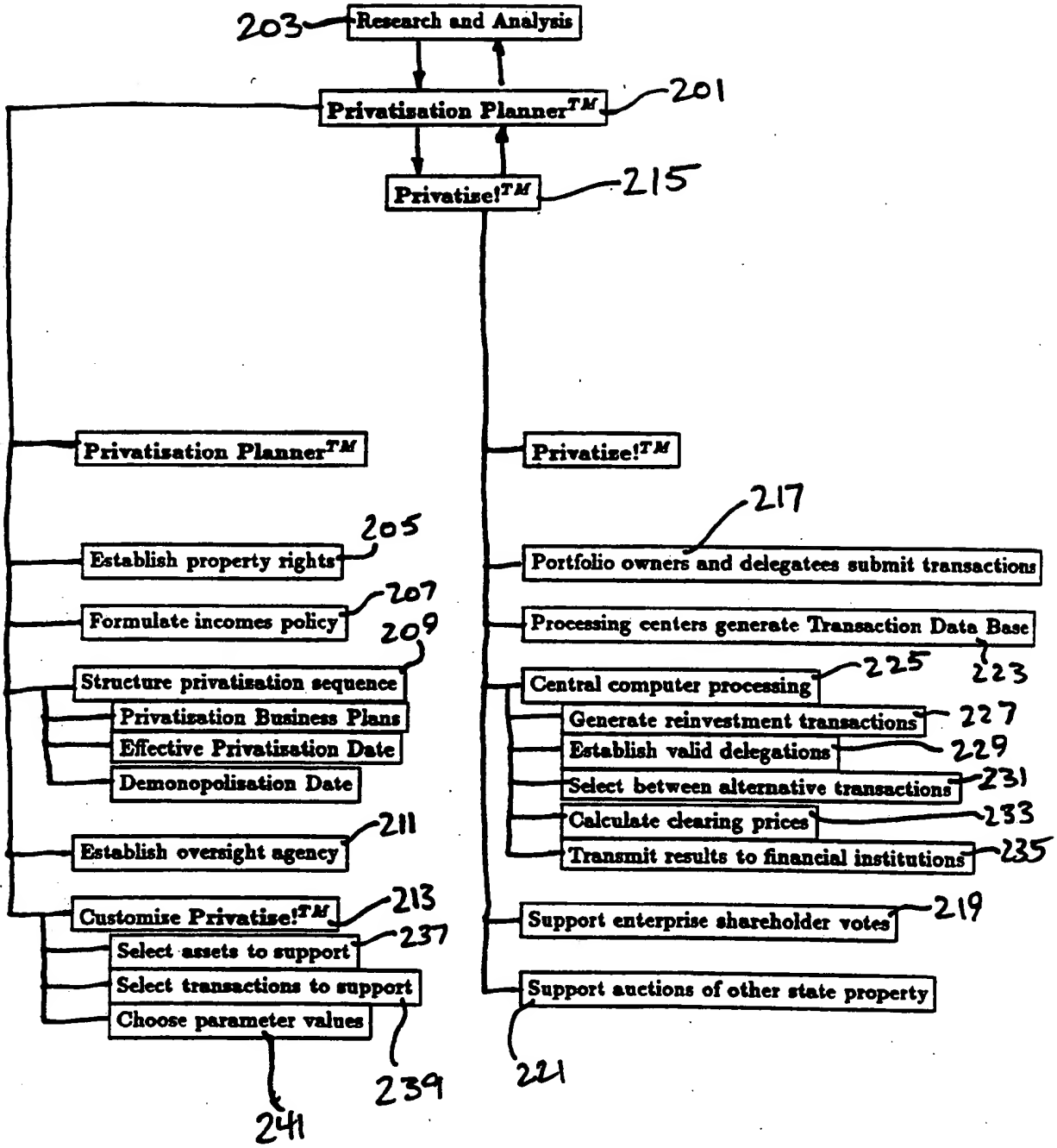

101
Enterprise leadership prepares Privatization Business Plan (PBP) including: selective *pasport* update, claimed physical facilities, organization census, demonopolization goal, in addition to stock compensation plan for board, management and workers.
103
Privatization Board Review of PBP: disapprove (with reasons), negotiate or approve; resolve inter-enterprise conflicts; establish effective privatization date.
105
Effective privatization date
Start of stock compensation plan
Periodic financial reporting requirements
107
Enterprise restructuring and spin-offs.
109
Privatization Board review of enterprise application for certification of demonopolization: disapprove (with reasons), negotiate or approve; establish effective demonopolization date.
111
Effective demonopolization date
Vesting of compensation stock
PRIVATIZATION COMPLETE
113

Fig. 2


203
Research and Analysis
Privatisation Planner™
201
Privatise!™
215
Privatisation Planner™
Establish property rights
205
Formulate incomes policy
207
Structure privatisation sequence
209
Privatisation Business Plans
Effective Privatisation Date
Demonopolisation Date
Establish oversight agency
211
Customise Privatise!™
213
Select assets to support
237
Select transactions to support
Choose parameter values
239
241
Privatize!™
217
Portfolio owners and delegatees submit transactions
Processing centers generate Transaction Data Base
223
Central computer processing
225
Generate reinvestment transactions
227
Establish valid delegations
229
Select between alternative transactions
231
Calculate clearing prices
233
Transmit results to financial institutions
235
Support enterprise shareholder votes
219
Support auctions of other state property
221

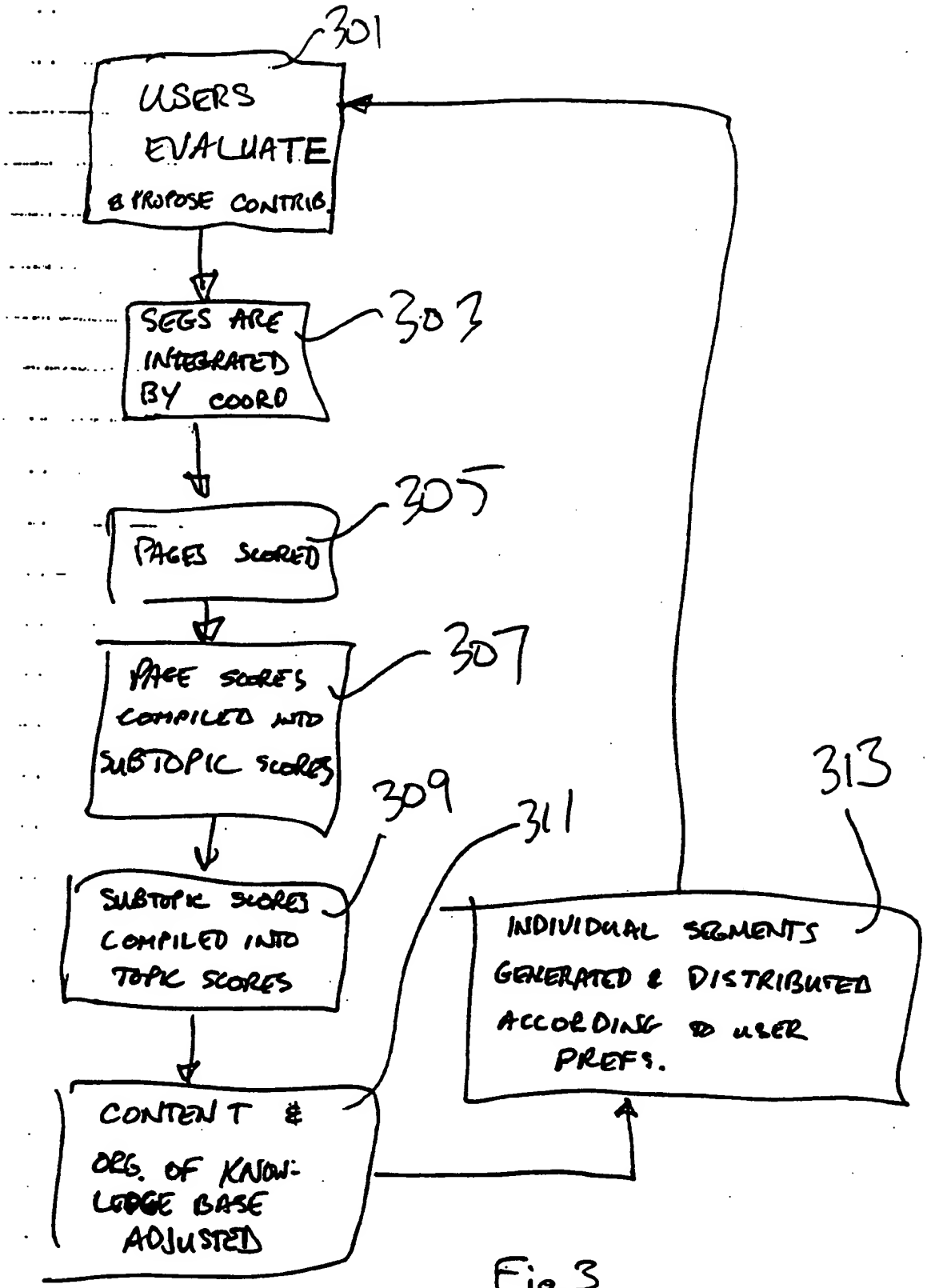

301
USERS EVALUATE & PROPOSE CONTRIB.
303
SEGS ARE INTEGRATED BY COORD
305
PAGES SCORED
307
PAGE SCORES COMPILED INTO SUBTOPIC SCORES
309
SUBTOPIC SCORES COMPILED INTO TOPIC SCORES
311
CONTENT & ORG. OF KNOWLEDGE BASE ADJUSTED
313
INDIVIDUAL SEGMENTS GENERATED & DISTRIBUTED ACCORDING TO USER PREFS.

Fig. 3

Fig. 4a

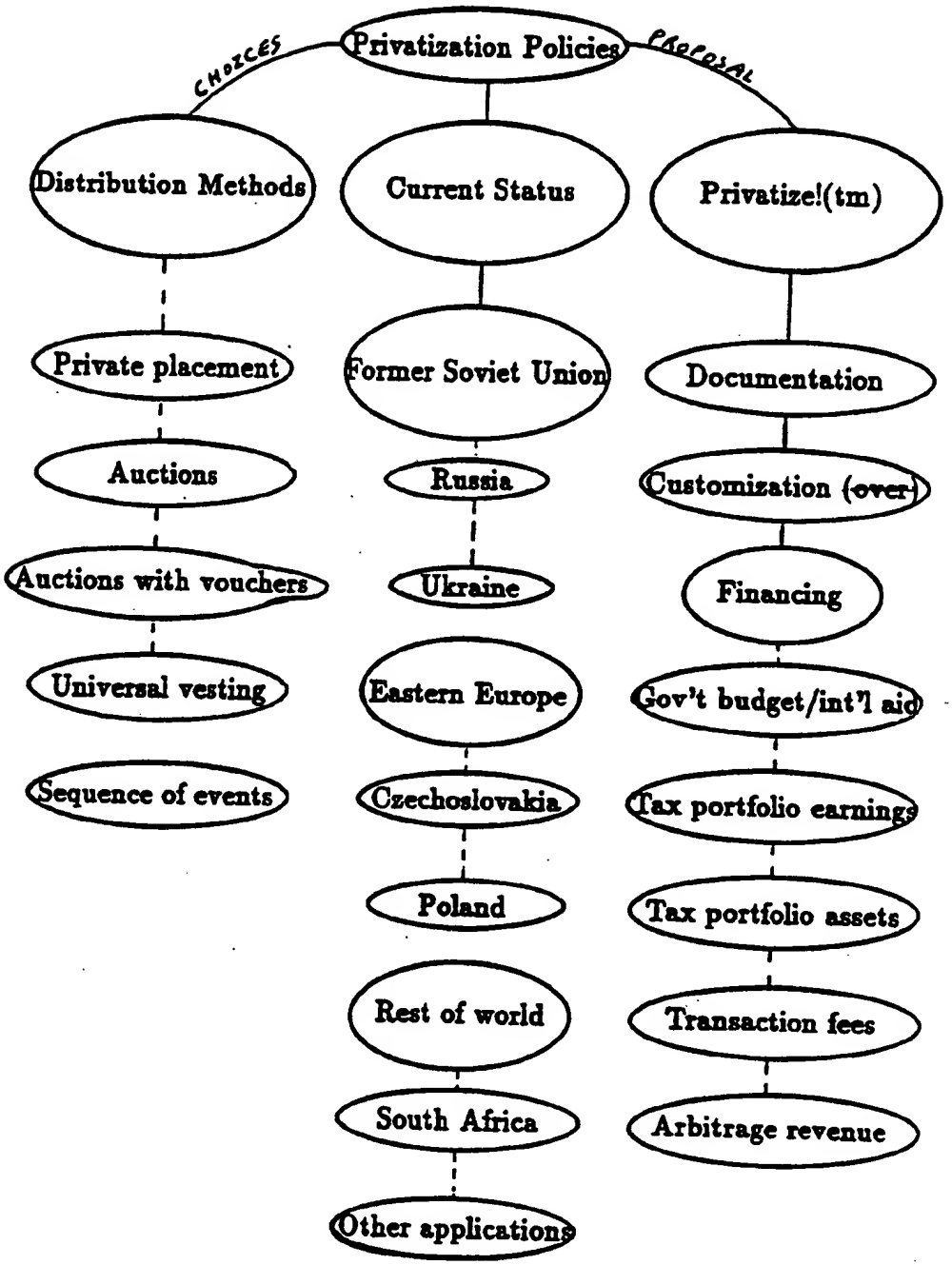

Privatization Policies
CHOICES
PROPOSAL
Distribution Methods
Current Status
Privatize!(tm)
Private placement
Auctions
Auctions with vouchers
Universal vesting
Sequence of events
Former Soviet Union
Russia
Ukraine
Eastern Europe
Czechoslovakia
Poland
Rest of world
South Africa
Other applications
Documentation
Customization (over)
Financing
Gov't budget/int'l aid
Tax portfolio earnings
Tax portfolio assets
Transaction fees
Arbitrage revenue

Fig. 5

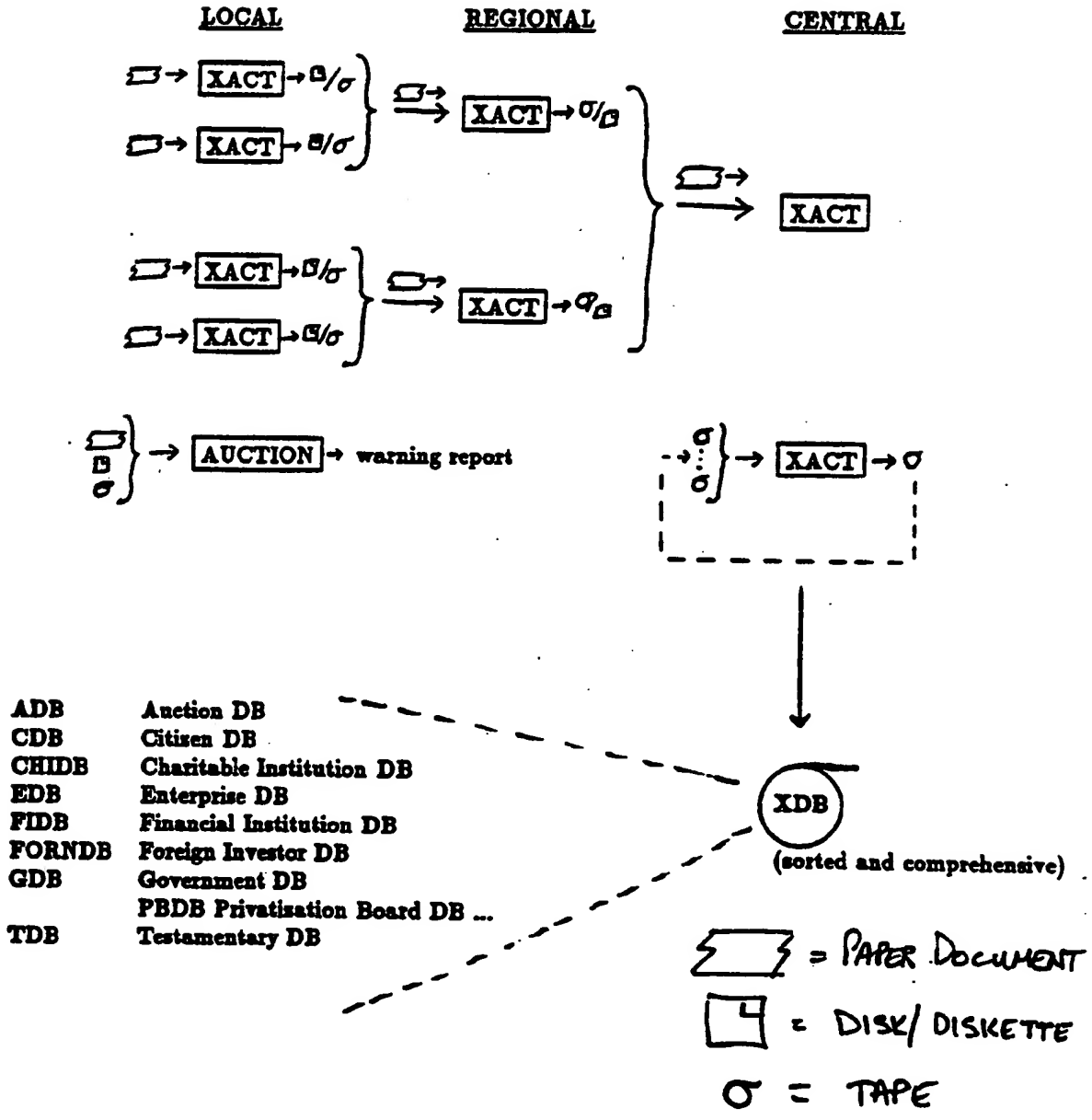
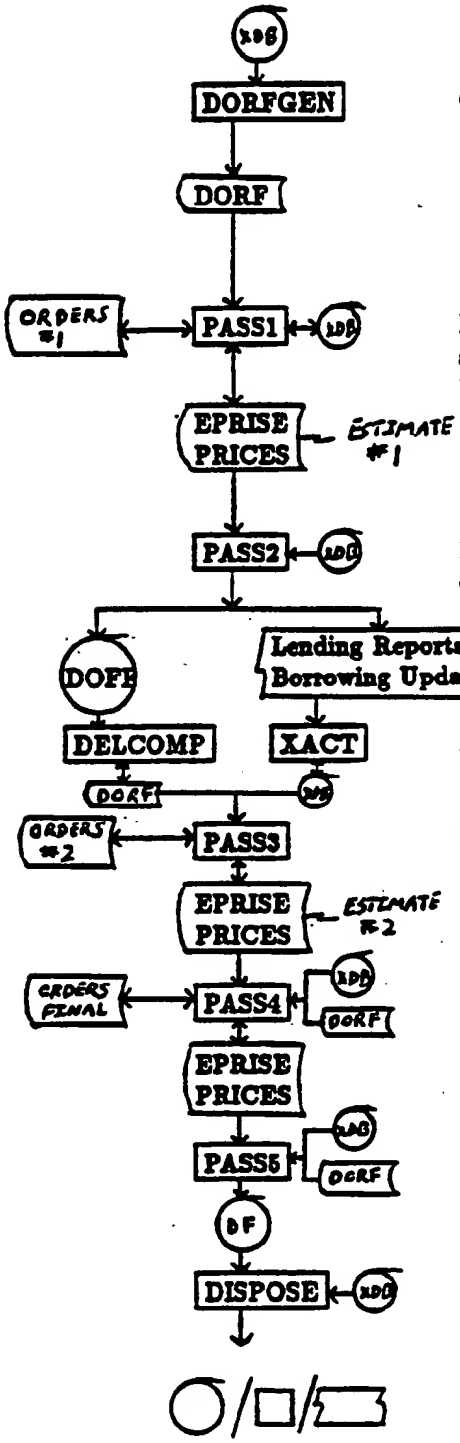

LOCAL
REGIONAL
CENTRAL
XACT
XACT
XACT
XACT
XACT
XACT
AUCTION
warning report
XACT
ADB Auction DB
CDB Citizen DB
CHIDB Charitable Institution DB
EDB Enterprise DB
FIDB Financial Institution DB
FORNDB Foreign Investor DB
GDB Government DB
PBDB Privatisation Board DB ...
TDB Testamentary DB
XDB
(sorted and comprehensive)
= PAPER DOCUMENT
= DISK/ DISKETTE
= TAPE

Fig. 6




Generate delegatee order file.

Estimate asset prices assuming all delegation offers above delegatee-specified minima are consummated. Update XDB with reinvestment transactions.

Estimate asset values in order to value delegation offers and lending offers.

XACT: Update XDB.
DELCOMP: Calculate delegatee compensation thresholds.

Estimate asset prices using final delegations.

Use price estimate #2 to decide whether to invoke ELSE transactions. Calculate final asset prices.

Execute transactions, calculate delegatee compensation, update XDB, generate DF.

Sort disposition file. Prepare tapes/diskettes/reports for transmittal to financial institutions.

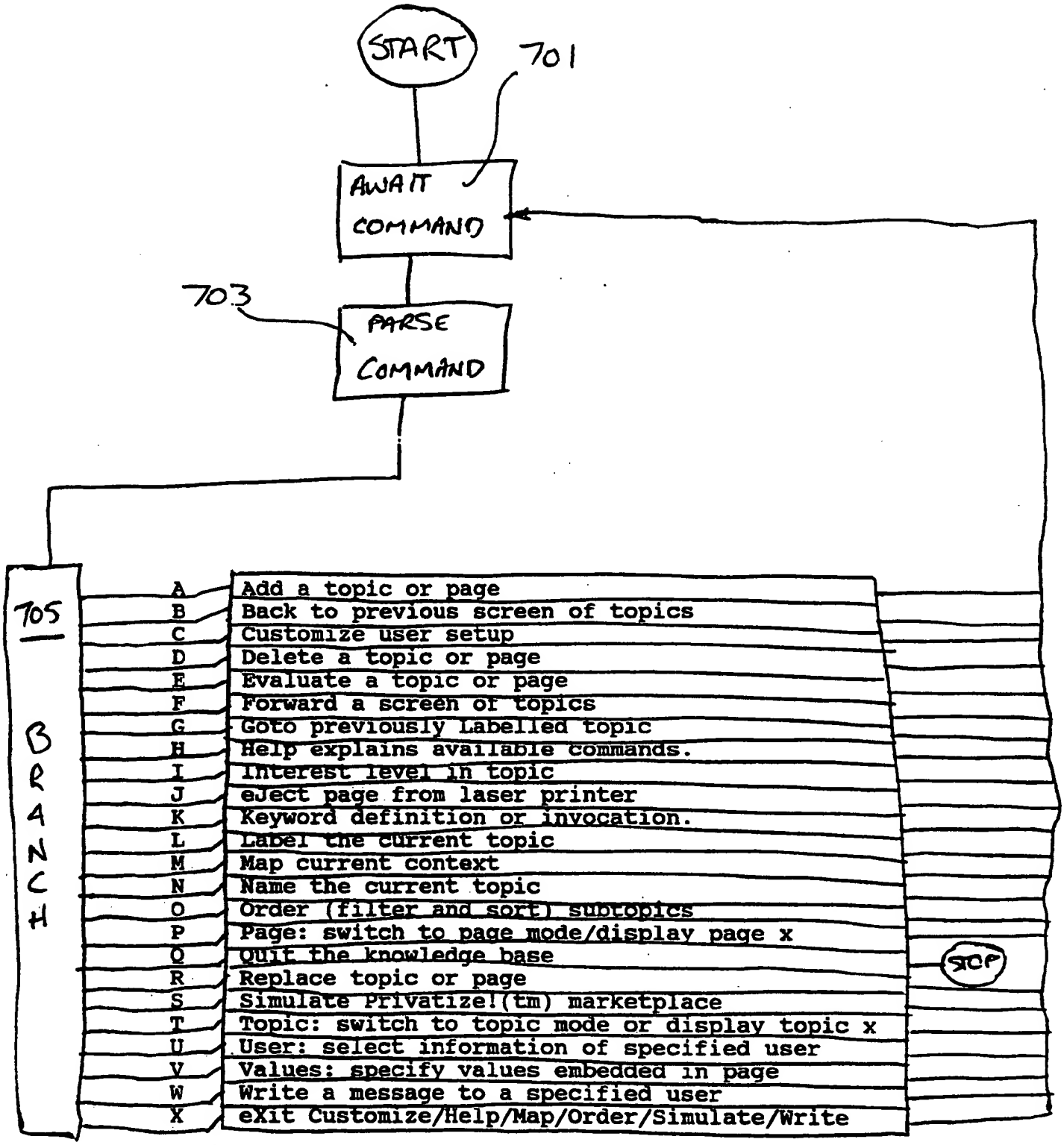

START
701
AWAIT COMMAND
703
PARSE COMMAND
705
BRANCH
A Add a topic or page
B Back to previous screen of topics
C Customize user setup
D Delete a topic or page
E Evaluate a topic or page
F Forward a screen of topics
G Goto previously labelled topic
H Help explains available commands.
I Interest level in topic
J eJect page from laser printer
K Keyword definition or invocation.
L Label the current topic
M Map current context
N Name the current topic
O Order (filter and sort) subtopics
P Page: switch to page mode/display page x
Q Quit the knowledge base
R Replace topic or page
S Simulate Privatize!(tm) marketplace
T Topic: switch to topic mode or display topic x
U User: select information of specified user
V Values: specify values embedded in page
W Write a message to a specified user
X eXit Customize/Help/Map/Order/Simulate/Write
STOP

Fig. 7

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US93/10557

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :G06F 15/21, 15/40

US CL :364/402, 408; 395/ 10, 11, 200, 600, 725

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 364/400, 401, 402, 408, 409; 395/ 10, 11, 54, 200, 600, 650, 725, 800, 925, 933

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | US, A, 4,953,085 (Atkins) 28 August 1990, abstract; figs. 2-3; col. 3, lines 52-68; col.9, line 14-36; col. 21, line 43 to col. 22, line 39; col. 28, line 54 to col. 29, line 5 | 1-8 & 15-17 |
| Y | US, A, 4,688,195 (Thompson) 18 August 1987, abstract; col. 17, lines 38-60; col.26, lines 47-52; col. 50, lines 6-28 | 9-11, 13 |
| Y | US, A, 4,930,072 (Agrawal, et al.) 29 May 1990, abstract; figs. 7-11; col.1, lines 10-17; col. 6, lines 30-43; col. 13, lines 20-23, | 12 |
| Y | US, A, 4,837,693 (Schotz) 06 June 1989, col. 22, lines 57-66; col. 25, lines 22-28; col. 58, lines 12-32 | 14 |

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

| | | | |
|---|---|---|---|
| * | Special categories of cited documents: | "T" | later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention |
| "A" | document defining the general state of the art which is not considered to be part of particular relevance | "X" | document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone |
| "E" | earlier document published on or after the international filing date | "Y" | document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art |
| "L" | document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) | "&" | document member of the same patent family |
| "O" | document referring to an oral disclosure, use, exhibition or other means | | |
| "P" | document published prior to the international filing date but later than the priority date claimed | | |

| | |
|---|---|
| Date of the actual completion of the international search<br>05 APRIL 1994 | Date of mailing of the international search report<br>11 APR 1994 |
| Name and mailing address of the ISA/US<br>Commissioner of Patents and Trademarks<br>Box PCT<br>Washington, D.C. 20231<br>Facsimile No. (703) 305-9564 | Authorized officer<br>ROY N. ENVALL, JR.<br>Telephone No. (703) 305 - 9731 |

Form PCT/ISA/210 (second sheet)(July 1992)*

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | US, A, 5,150,308 (Hooper, et al.) 22 September 1992, figs. 13-14; col. 14, line 62 to col. 15, line 3; col. 16, lines 10-26; col. 26, lines 23-52 | 9-13 |
| A | US, A, 4,975,840 (DeTore, et al.) 04 December 1990, col. 4, lines 9-20; col.4, line 36 to col. 5, line 39; col. 16, lines 26-34 | 1-8 & 15-17 |
| Y, P | US, A, 5,191,638 (Wakami, et al.) 02 March 1993, figs. 2,7, & 9; col. 1, lines 28-56; col. 7, lines 4-23; col. 9, lines 8-24; | 1-8 & 15-17 |
| Y,P | US, A, 5,257,185 (Farley, et al.) 26 October 1993, col. 13, lines 4-11; col. 29, lines 3-12; col. 30, line 26 to col 31, line 26; col. 20, lines 36-59; col. 35, line 46 to col. 36, line 37 | 5 & 8-17 |
| A | DE, A, 3830326 A1 (Dethloff) 15 March 1990, abstract | 1-8 & 17 |
| A | NATO Conference Proceedings held 03-05 September 1989, J. L. Roos, "SAM: A Knowledge-Based Sysytem for Modeling an Economist", NATO ASI Series, Vol. F 61, pages 407-417, especially pages 408-411 | 1-8 & 15-17 |
| A | European Journal of Information Systems , Vol. 1, issued 02 March 1991, A. Danchev, "Information Technologies in the Transition to the Market Economy: the Case of Latecomers", pages 113-119 | 5 & 17 |
| X<br>---<br>Y | Second International Expert Systems Conference held 30 September to 02 October 1986, D. Kruchten, "An Expert Financial Portfolio Management Advisory System", pages 95-97 | 1-3 & 15-17<br>---<br>4-8 & 15-17 |

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US93/10557

**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

Telephone Practice

I. Claims 1-8 and 15-17, drawn to a method of managing and processing financial transactions, classified in class 364, subclasses 402,408.

II. Claims 9-11, 13, and 15-17, drawn to a method of operating and accessing data bases, classified in class 395, subclass 725.

III. Claims 12 and 15-17, drawn to a method of operating segmented data bases, classified in class 395, subclass 600.

IV. Claims 14 and 15-17, drawn to a method of operaing a data base as a gateway to other data bases, classified in class 395 subclass 200.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

B. FIELDS SEARCHED
Electronic data bases consulted (Name of data base and where practicable terms used):

APS, DIALOG

search terms: economy, privatization, free market system, trade, computer, knowledge base, expert system, data bases, gateways, portfolio management, transactions, investments, shares, actuaries, annuities

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